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S. Grand Canal Conservancy

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THE FAR EASTERN REVIEW

COMMERCE :: ENGINEERING :: FINANCE

VOL. XII.

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No. 9

THE SOUTH GRAND CANAL CONSERVANCY SCHEME

[REPORT BY MR. H. VAN DER VEEN, CONSULTING ENGINEER TO THE NATIONAL CONSERVANCY BUREAU]

This conservancy work, of which a plan has been drawn up by the South Grand Canal Conservancy Bureau, under the able directorship of Mr. F. Pan, comprises the improvement of the South Grand Canal in Shantung, south of the Hwang-Ho, (Yellow River) as well as the conservancy of the Ta Ching Ho, Wen Ho and Sze Ho, which finding their rise in the Western Hills of Shantung, have as their only outlet the Grand Canal, with the exception of the Ta Ching Ho, which partly empties into the Yellow River.

As these rivers are all mountain rivers subject to sudden rises, and as they have moreover no sufficient outlet at present, inundations are bound to occur, causing year after year not only enormous losses, but also turning large areas of the country which under normal circumstances would have been fertile land, into permanent swamps.

Historical Review

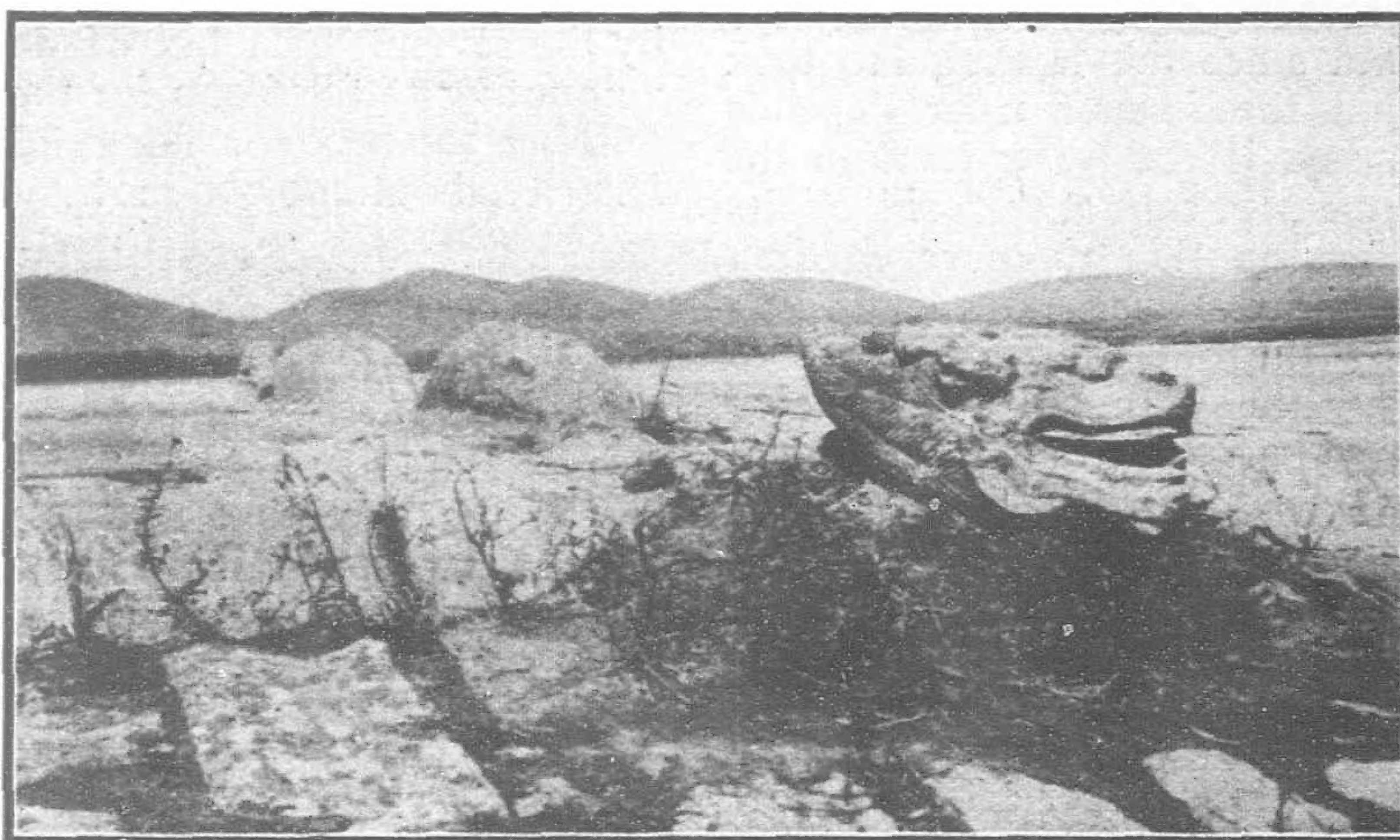
Before the Grand Canal was made the various rivers which drain the Western mountains had, with the exception of the Ta Ching Ho, no outlet to the sea at all, but formed large lakes in the low country at the foot of the hills. It was by connecting those lakes, such as the Wei Shan Hu, Chao Yang Hu and Tu Shan Hu, that the canal was most probably formed. Further north the canal is for the greater part artificial, so also may be the part south of the Wei Shan Lake. The total length of the Grand Canal from where it enters Shantung in the South to where it meets at present the Yellow River is 279.20 kilometres. To overcome the difference in elevation, not less than 33 locks had to be built, the highest section being between Kai Ho Chun and Yuang Ko. In order to feed different sections of the canal enormous engineering works had to be made, one of the most important being the Tai Tsun Ba (or weir) in the bed of the Ta-Ching Ho, whereby during the low water season all the water is forced to follow the Wen Ho.

In my opinion this river from the dam to the Grand Canal is artificial and only made to feed the higher sections of the Canal. Not far from Wen Shang Hsien another dam is built, the Ho Chia Ba, whence two channels lead to other sections.

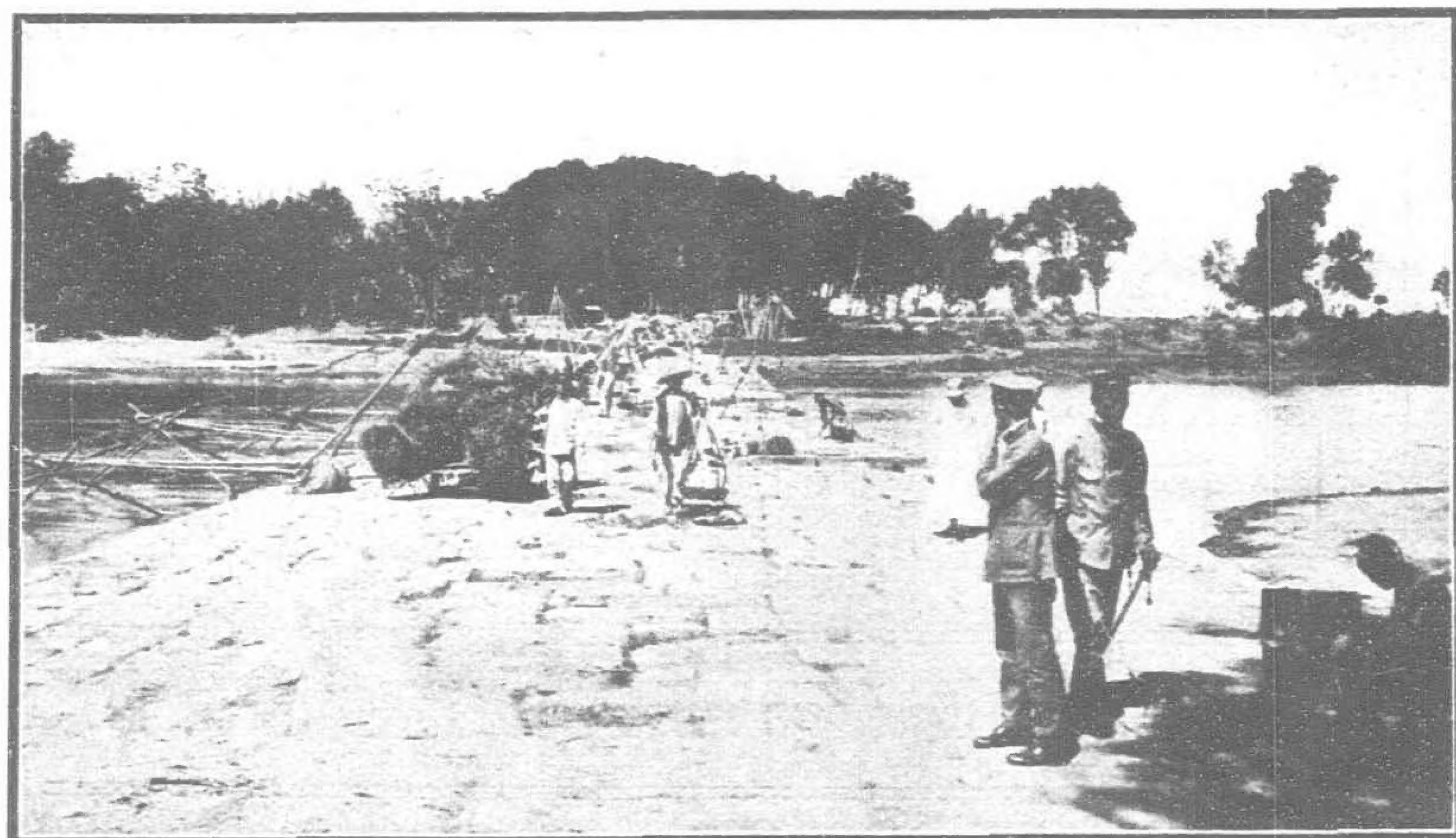
The Tai Tsun Ba was necessary to prevent the water from the Wen Ho following the Ta Ching Ho, which at the time the Canal was made had its own free bed to the Gulf of Pechili. Another important work is the Kin Ko Ba, near Yen Chow, or Tze Yang Hsien, in the Sze Ho, in order to raise the water-level to a certain height so that a part of the water could be used to feed the Grand Canal near Hsi Ning Hsien. For this purpose the Fu Ho was dug also with a lock at the entrance, the He Feng Ko. The Kwang Ho, branching off from the Wen Ho, was probably another feeding canal, but as it proved insufficient, it was abandoned and the Kin Ko Ba works, including the Fu Ho, were made. In order to supply the Grand Canal with water during the dry season the Mata Hu, Su Shan Hu, Nan Wang Hu and Ma Chang Hu were used as storage basins and supplied with locks to regulate the amount of water. Most of the works are still in very good condition and bear proof of the high engineering capacity of olden times, of which the Chinese nation has every reason to be very proud. It was a gigantic undertaking for those times, about five centuries ago, when so little about engineering was known, and high respect is therefore due to those who were able to bring the work to such a good end.

During ages the canal has been in good condition, although it must naturally have suffered much by the deposits of the rivers which used it as an outlet to the sea, which they did not have before. There is no doubt that in this respect the canal was also an improvement on the drainage of the country. That much excavating had to be done to keep the fairway deep enough is clearly shown by the enormous dykes or mud deposits, almost hills, which are seen at several places along the banks of the canal.

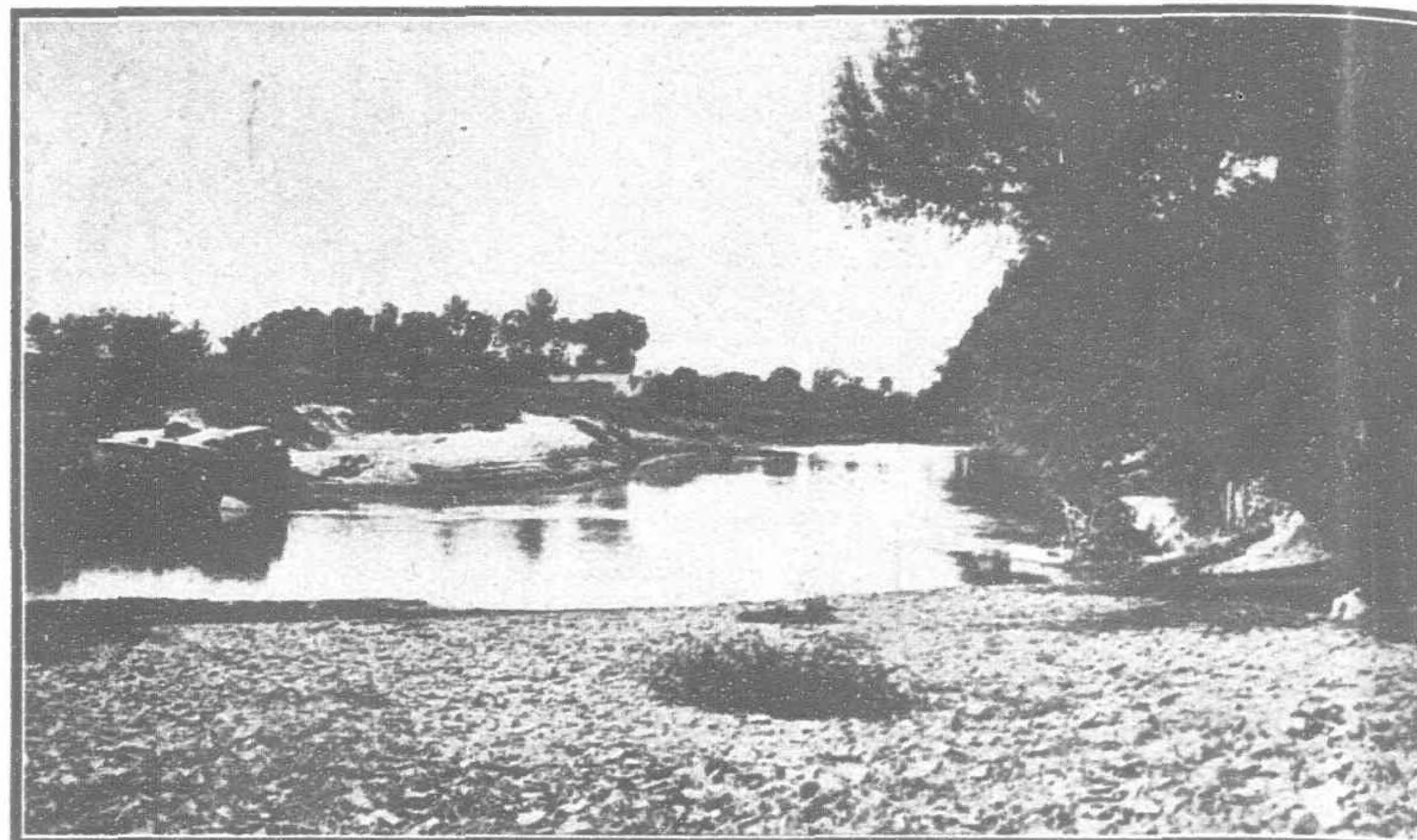
This satisfactory state of affairs lasted until in 1851 the Hwang Ho broke through its North Dyke, not far from Kai Feng Fu, and flooded the low lying country in the South West of Shantung Province, looking for another outlet towards the sea which it found by usurping the bed of the Ta-Ching Ho and which it has kept up to the present moment. This put an end



THE NGO-YU—"FISH THAT FIGHTS THE WATER"—ON A WEIR



KIN KO PA NEAR YEN-CHOW, ACROSS THE SZE-HO



PART OF WEIR AT CHANG-CHIA-CHIAO

to the usefulness of the Grand Canal, which, specially in those sections nearest to the Yellow River, got filled up with deposits to such an extent that navigation was henceforth rendered impossible. The connection with the Yellow River was re-established by digging a new channel, the Po Ho, which connects the Grand Canal near a village called An Chan Chun with the lower Ta-Ching Ho.

Already on former occasions during temporary escapades of the Hwang Ho (Yellow River) had this region to suffer and it is said that some 200 years ago the entire area was flooded, of which the swamps West of the Yen Ho still bear proof, but never was the harm so thoroughly done as in 1851. Not only was the Grand Canal rendered useless, but the Ta-Ching Ho lost its own free outlet to the sea, which is the cause of yearly repeated serious inundations.

Some Causes of the Present Unfavourable Conditions

As said already in the preceeding the Ta-Ching Ho lost its own outlet towards the sea since the Hwang Ho took its place. The consequence is that the former river depends entirely upon the latter, that is to say, if the water-level in the Yellow River is high the Ta Ching Ho cannot get rid of its water, and as the time for freshets in this river very often coincides with the time that the Yellow River is swollen, only very little water can escape along the old course and has to follow another way. Consequently the Wen Ho has to bring down more water. This causes again a rise in the Grand Canal which affects the discharge of the Sze Ho. In case freshets should happen to take place simultaneously in the Wen Ho and the Sze Ho, dyke-breaks, and consequently inundations, are bound to occur. But even without dyke-breaks in the Wen Ho, Yen Ho or the Sze Ho the result is already bad enough, for on account of the water of the Ta-Ching Ho not being able to escape quickly enough, hindered by the high water of the Yellow River, large areas such as the Tung Ping District, get inundated and remain practically in that condition during the entire rainy season, so that cultivation of the land is out of the question. Probably the bad effect would not have reached the present extent if the large storage basins such as the Ma Ta Hu (lake), Nan Wang Hu and Ma Chang Hu, together covering about 120 square kilometers, still existed, and if moreover the connection between Nan Wang Hu and Chao Yang Hu had been in good condition. But as it is, these lakes do not now exist as they have been silted up and are now cultivated land, and the Niu To river has been silted up also.

Thus the only thing the Wen Ho can do is to fill the Su Shan Hu and send the rest of its waters through the Grand Canal. This channel is, however, entirely incapable of conveying large quantities of water and consequently the water in Wen Ho and Ta Ching Ho will rise until the unavoidable dyke-breaks take place.

The South Grand Canal, Conservancy Bureau's Scheme of Improvement

In rough outlines the plan, which is divided into three sections, is as follows:—

The first section deals only with the improvement of the Ta-Ching Ho. This improvement is to be carried out by building dykes on both sides of the stream from Tung Ping Hsien down to the Yellow River so as to prevent the water from flooding the Tung Ping District.

The second section deals with the improvement of the Wen Ho, Sze Ho and Grand Canal, and in connection herewith, the reclaiming of the swamps.

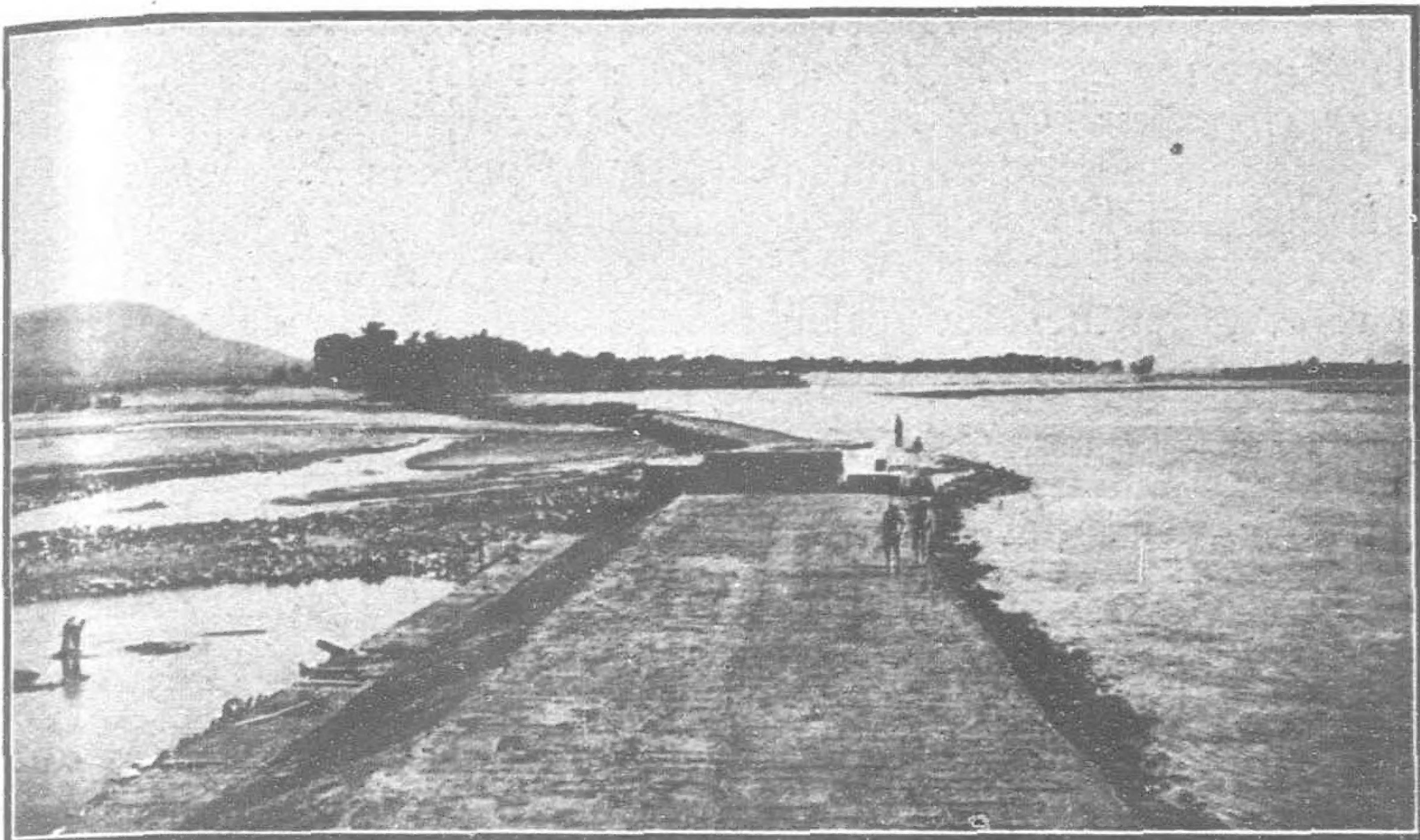
These improvements are thought to be attainable as regards the Wen River by increasing the outlet, that is, by digging out the silted up canals in the Nan Wang Lake so as to establish a new connection through the Niu To Ho with the Nan Yang, Chao Yang and Wei Shan Lakes. The Sze River is to be improved by rectifying and enlarging the T'oung Sze Ho so as to be able to conduct more water towards the Tu Shan Lake. The Grand Canal will be improved merely by dredging the shallow parts.

According to the plan the costs could be entirely defrayed by the revenue of a tax of \$1.00 per mow of reclaimed land, amounting to \$826,000 for the first year. This is for Tsi Ning District 300,000, for Tungping district 326,000,—and for Yu Tai District about 200,000 mow.

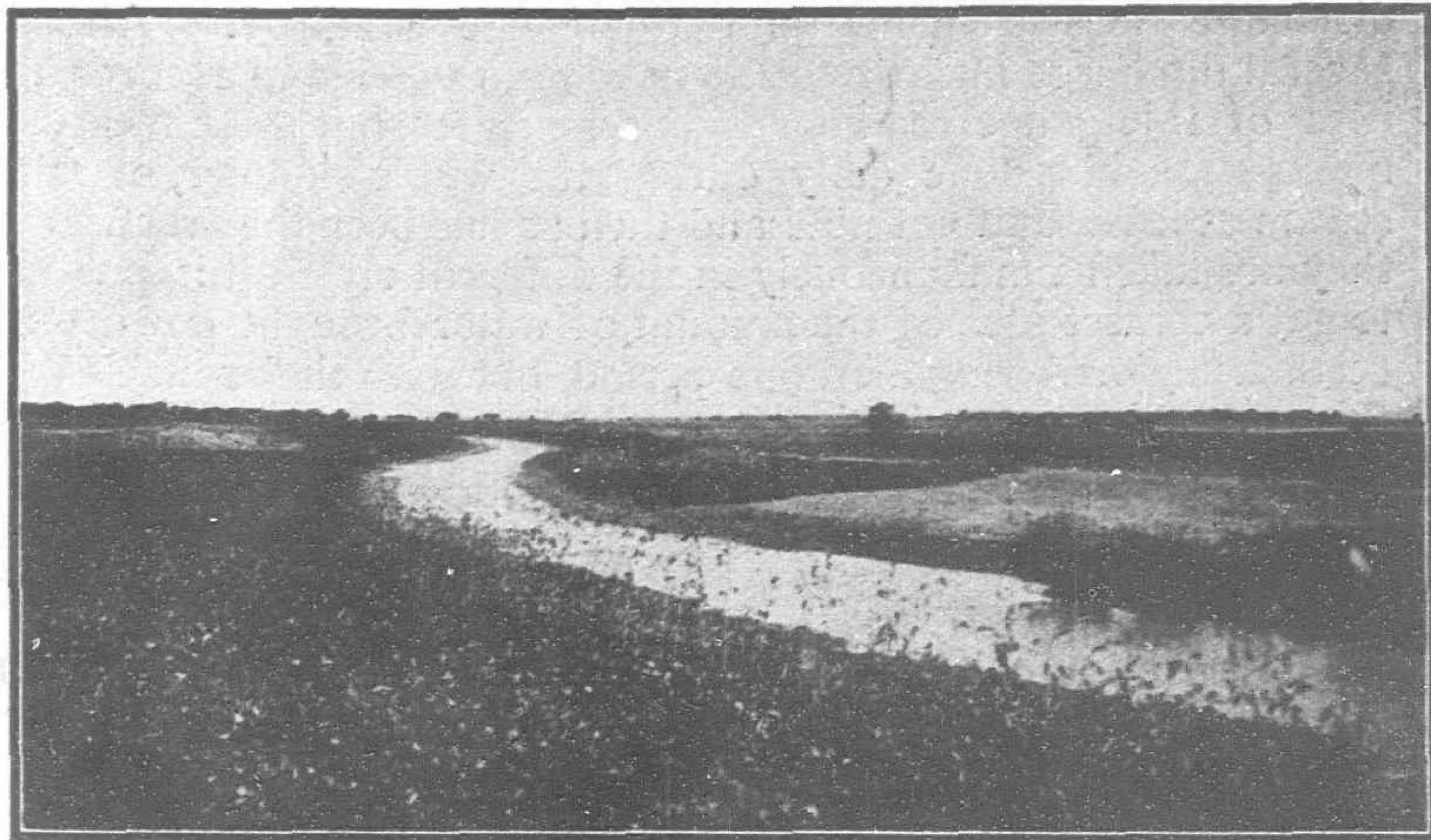
Feasibility of the Scheme

In order to be able to judge better whether the contemplated scheme is feasible or not, it is necessary first to go more into the details of the reasons which are the cause of the present unsatisfactory state of affairs. As already said, one of the main causes lies in the fact that the Ta-Ching Ho lost its own free outlet because the Yellow River took its bed. Now the bad effect this river has on the discharge of the Ta Ching Ho would never have taken such proportions if the Hwang Ho did not bring down so much silt, but as it is, the mouth of the Ta Ching Ho gets absolutely choked up during every rise in that powerful river and therefore although the water may drop all of a sudden the discharge capacity of the Ta Ching Ho is but slightly increased. The reason of this is that the Ta-Ching Ho first has to make a new channel but as this channel making without human assistance is but a very slow process during which dangerous rapids are formed, it very often occurs that before the barrier has been removed altogether a new rise in the Yellow River builds it up again. This is a most serious question and in my opinion everything should be done to remove this evil if possible, for if the Ta-Ching Ho, as soon as the water in the Yellow River falls, could regain its full capacity, inundations as happen now in Tung Ping District, even if the other conditions remained unaltered, would never reach the extent they have now. It is therefore most necessary to study carefully this question, of which at present no data are as yet available.

Owing to the incapacity of the Ta-Ching Ho the Wen Ho has to bring down the bulk of the water, thereby raising the water in the Grand Canal, which waterway has only a very limited capacity. It is obvious that to improve the conditions this Canal must be relieved and the solution suggested by the South Grand Canal Conservancy Bureau to make a connection through the Nin To Ho with the Chao Yang Hu and Wei Shan Hu is therefore a very good one.



THE TAI-TSUN WEIR

REMAINS OF GRAND CANAL BETWEEN YELLOW RIVER AND ONHON CHUN.
(THIS PART IS SILTED UP)

The necessity of relieving the canal becomes the more urgent as further South near Liu Chiao the waters of the Sze Ho have to be received also. This river is of a similar nature as the Wen Ho, that is, subject to sudden freshets. Near Chiang Chia Chiao the Sze Ho splits into two branches, one the Toungh Sze Ho leading towards the Fu Shan Hu, and the other the Hsi Sze Ho towards the Grand Canal. The Tu Shan Hu is a storage basin which is through eighteen openings connected with the Canal, which is again connected on the opposite side with the Chao Yang Hu. As however the Toungh Sze Ho is considerably silted up, the immediate effect of the storage basin is not felt during a freshet and consequently the greater part of the water runs down the Hsi Sze Ho towards the Grand Canal. Very often this waterway is already in a high stage owing to the water from the Wen Ho, but even if that should not be the case the waterlevel would quickly rise only by the amount of water coming down the Sze Ho and consequently the water-level in that river will rise, too often resulting in serious dyke-breaks. It is evident that also in this case an improvement of the discharge of the water would solve the problem, which the South Grand Canal Conservancy Bureau thinks, and in my opinion rightly, to be able to find by improving the Toungh Sze Ho.

It is now the question to ascertain whether the necessary increase of the discharge of the waterways in question can be obtained by the proposed scheme or not.

In short, the proposed scheme comprises the improvement of the Ta-Ching Ho, Wen Ho, Niu To Ho and Sze Ho (Toungh and Hsi Sze Ho).

Would an improvement of the above mentioned waterways solve the question?

The answer to this question is that the suggested improvements solve the problem if at the same time the storage capacity of the various lakes combined with the discharge capacity of the Ta-Ching Ho and the Grand Canal below the Wei Shan Lake are sufficient to cope in such a way with the amount of water brought down by the various rivers that the water-level in those rivers

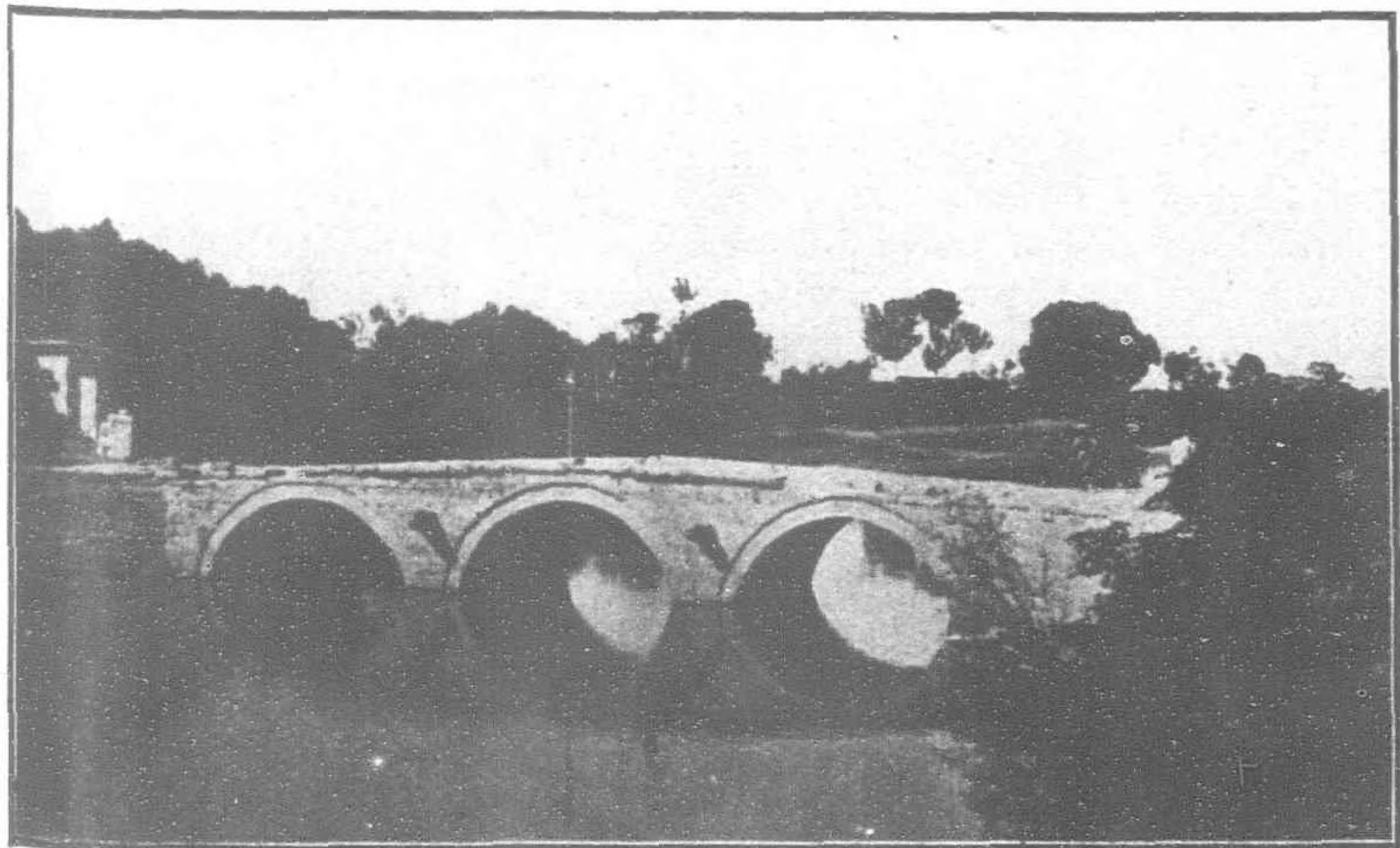
does not rise any more to a height which may cause dyke-breaks and consequently inundations, and moreover that the water-level in the storage basin does not get raised to a height whereby drainage of the low lying country is impossible.

What has to be determined first, therefore, is the amount of water which may be expected and secondly what is the storage capacity of the lakes and what the capacity of the outlet (Grand Canal).

In view of the sudden rises in these mountain rivers the storage capacity of the lakes is the most important, as their outlet is small and only able to deal with the accumulated water over a long period. In time of freshets everything depends, therefore, upon a quick discharge towards the storage basin and the capacity thereof, whereas the final outlet only plays a secondary role unless the freshets should last very long, in which case it is possible that the water-level in the storage basins gets raised too high so that it interferes with the proper drainage of the country. Now the Grand Canal is an outlet with only a very limited capacity, specially during the summer, on account of the enormous quantity of water it receives lower down from the Ye Ho. It is, therefore, very desirable that the condition of the Grand Canal below Wei Shan Lake be seen to as well, and that section of the Grand Canal would benefit enormously if the Ye River would have its own outlet to the sea.

In order to collect the necessary data, the South Grand Canal surveying Bureau was established, which commenced its task early last year. Although much work, and very good work, has already been done, it is not entirely finished yet, and it is therefore not possible to form a definite opinion just now, on the feasibility of the scheme. For this the most elaborate data are necessary. Moreover the entire survey of the country must be finished first if possible with contour lines, but as this cannot be done, owing to shortness of funds, only the low lying land could be levelled and cross sections taken of the lakes and swamps.

The work was expected to be finished by the end of the year but besides the survey more is necessary to make a plan, as f.i.



BRIDGE OVER SZE-HO RIVER



TRAVELLING BY WHEELBARROW IN SHANTUNG

discharge measurements and tide-gauge readings. Already several discharge measurements have been taken and records are kept of tide-gauge readings along the rivers, but these measurements should be done daily during the whole summer, or rainy season at least, and not now and then as has been the practise. If they are taken simultaneously in the different rivers it is possible to get a correct idea of the amount of water brought down on a certain day or during a certain period, but with the available data this cannot be ascertained. It would be infinitely better even if two summers could be spent in collecting the data, for rainfall is very irregular, and the more data obtained the nearer we get to a fair average, and on this the calculations have to be based. In order to be able to take simultaneous discharge measurements a larger staff is of course required, as each gauging station wants its own men, but it is not necessary to have in one river several places where the discharge is measured. For each river one gauging station is sufficient. For instance one station in the Wen Ho above Tai Tsun Ba and one in the Sze Ho above Kin Ko Ba would be enough to learn the amount of water brought down, and if one gauging station were established in the Grand Canal at Han Chwang we would be able to determine exactly how much water is being stored up in the lakes.

There are also kept records of the rainfall but this has been done only in one place, which is not sufficient. Records of rainfall although they have no immediate value in connection with the drawing up of a plan are later on very useful to determine the percentage of the rainfall which is brought down by the rivers, but in that case several rain-gauges should be established all over the catching basin of which careful records should be kept during a period of at least 10 years.

When the surface of the storage basins and the height of the water-level therein are known (this is after the preliminary work is finished), it can be figured out how much this level will rise during freshets in the rivers, and knowing the outlet of the lake we can also figure out how long it will take to lower the water again to its ordinary level. This is necessary in order to determine whether the at present continually inundated low country and swamps are able to drain off on the lake. In other words, whether reclamation is possible or not. As it is the idea to defray the costs of the improvement out of the sale of, and taxes on, the reclaimed land, this is most important.

I will endeavour to give, based on data already collected, an illustration of how a calculation has to be made. However, it has to be borne in mind that as the calculation is based on data which are entirely insufficient as yet, the result is only to be accepted under very much reserve, although, as will be seen, it is of sufficient value to prove that the contemplated scheme is worth going into more carefully. I mean to say that it is worth while to spend more money on a proper study of the project.

According to the map used the Su Shan Hu has a surface of 45 square kilometers, the Ta Shan Hu 204 sq. K.M., the Chao Yang Hu 142 sq. K.M., the Wei Shan Hu 408 K.M. and if we take it for granted that of the swamp through which the Niu To Ho runs 73 sq. K.M. can be reclaimed, there remains 100 sq. K.M. which may be considered as storage basin, so that the total surface of the above mentioned lakes amounts to roughly 900 sq. K.M. or 900,000,000 square meters. By a rise of the water-level of 1 m. the amount of stored up water is consequently 900,000,000 cubic meters, and if the level should rise 2 meters it would mean that 1,800,000,000 cub. m. of water had been flowing into the lake so that the amount of water which had been disposed of would have been considerably more as we did not take the water into consideration, which would have drained off through the lake at Hanchwang. This is an enormous quantity.

Now supposing that the Wen Ho and Sze Ho are in flood at the same moment. Let us take the highest discharges which were recorded up to the middle of August of last year, that is for the Wen Ho and Sze Ho each 130 M³ per sec. or together 260 M³. Let us further suppose that the Pei Ma Ho and other minor rivers brought down 40 M³ then is the total amount of water brought down per second 300 cub. M. or 1,080,000 cub. M. per hour or 25,920,000 c.m. per day. This means that if during 35 days in succession the above mentioned amount of water had been brought down the water level in the lakes would only have risen 1.00 m.

It is quite probable that during a shorter period more than the above mentioned amount of water per day has been brought down, however, even if this should occur, it is unlikely that average will amount to more than what I presumed. Besides, I did not take into consideration the amount of water which may have run off through the Ta Ching Ho or Grand Canal. I think, therefore, that the above calculation is on the safe side and that I may draw the conclusion that as far as the storage capacity of the lakes is concerned the South Grand Canal improvement scheme is quite practicable.

This question being settled, it remains now to be seen whether it is possible to make the entrances to the lakes such that sudden rises in the river can either not occur or, if they do occur during extraordinary freshets that they are only limited in height and duration.

This is a very important point, for if the storage capacity of the lakes were ten times larger and the approaches to the lakes insufficient, that large storage capacity would not help at all.

The Grand Canal near Liu Chao rose from April to August about 3 M. although the Sze Ho and Wen Ho did not bring down such extraordinary quantities of water. Moreover, we note that the waterlevel of the Canal at Hsu Chia Ying Fang (this is just below the Fu Shan and Chao Yang Hu) only rose 0.80, which most probably would have been even less if the connection between that lake and the Wei Shan Hu had been better. From this the conclusion may be drawn that the lakes above mentioned had enough capacity to store the water of the Sze Ho and partly of the Wen Ho as well, without getting raised too much, but also, and this is certainly not less important, that the connection between the Sze Ho and the lakes was entirely insufficient to cope with the quantity of water brought down by that river in due time. For if the T'oung Sze Ho, which is the connection, had been able to dispose of more water, the Si Sze Ho would only have received a small quantity and consequently the Grand Canal would never have been filled to the height which it reached on the 7th of August.

The waterlevel in the Grand Canal at Fen Siei Ko rose during the same period from about +35 m. to +39 m. Although the height of the waterlevel at that place depends, to a certain extent, on the fact of whether the lock at Liu Lin is closed or not, it would certainly never have come so high if the canal could have had by open locks sufficient capacity. That this waterway is absolutely insufficient as a conveyance of water is, therefore, I think sufficiently proved by the above facts, but besides it should not be used as such, as it is meant to be only a fairway, and a strong current would undoubtedly not be in the interest of shipping. Consequently it is necessary, in order to improve the present conditions, to find for the Sze Ho and for the Wen Ho proper communications with the lakes independent of the Grand Canal.

For the Sze Ho the solution is to improve the T'oung Sze Ho, for the Wen Ho to open the ditches in the Nan Wang Hu, to enlarge the Niu To Ho and to improve the connection between the Chao Yang Hu and the Wei Shan Hu or to improve the discharge of the Ta Ching Ho into the Yellow River, which if possible would be better.

Calculations of the Required Cross Sections of the Connections Between Rivers and Lakes

Although, as I said already, it is not possible with the data on hand to give any definite solution, they are nevertheless sufficient to assist in forming some rough idea of the amount of work which will have to be done.

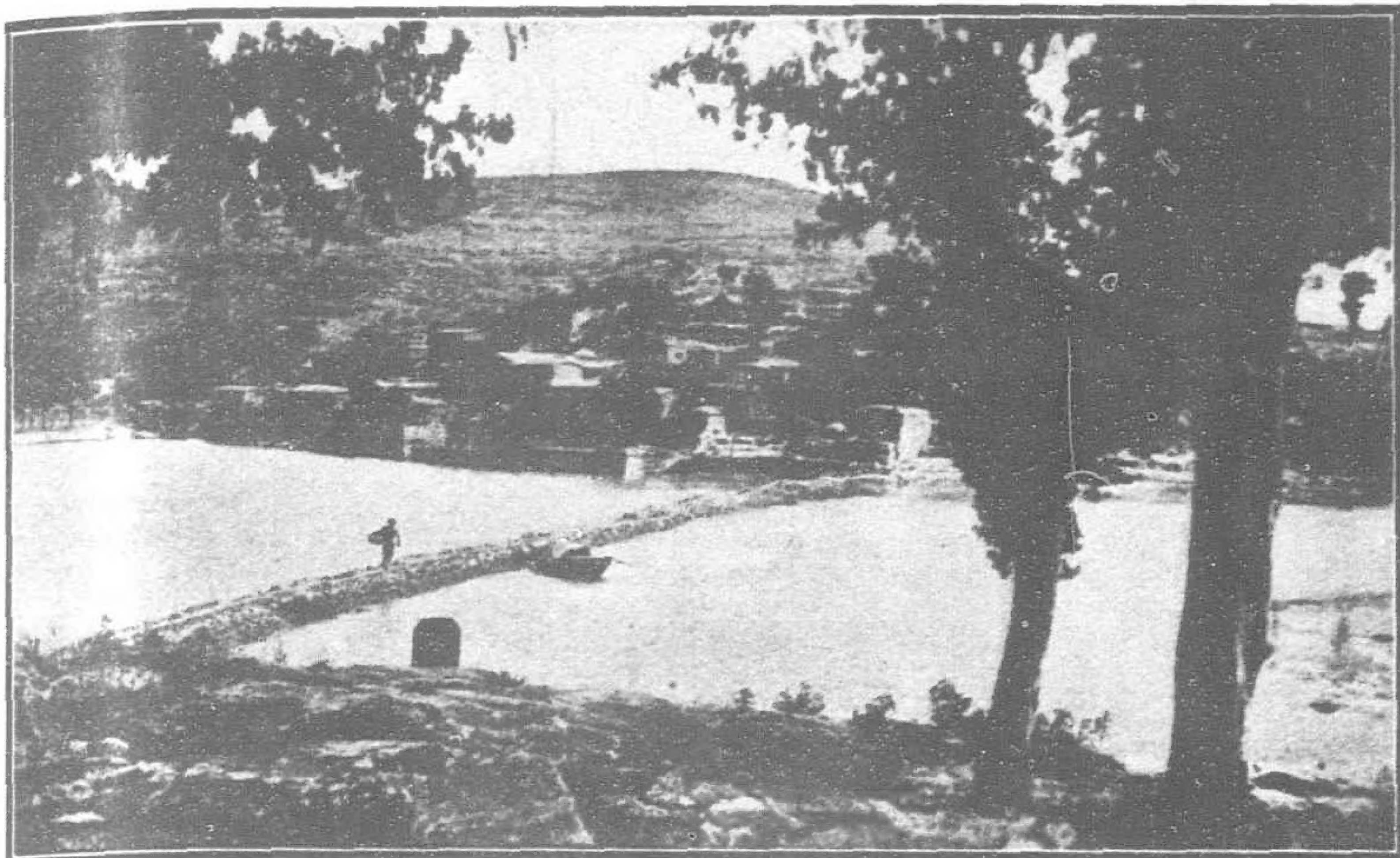
I will figure out here the area of the cross sections of the connections between river and lakes which are necessary to be able to cope with the amount of water brought down.

The T'oung Sze Ho.—According to the survey of the South Grand Canal Conservancy Bureau, the length of the T'oung Sze Ho from Chang Chia Chiao to Tu Shan Lake is actually measured 24.30 KM, whilst the difference in elevation is 5.91 m. From this follows that the average slope of the waterlevel is:

$$\frac{5.91}{24.300} \text{ or about } 0.00024 \text{ m per m length}$$

Now the discharge of a normal river is represented by the following formula:

$$D = A \times v \quad \text{in which}$$



SCENE ON THE PO-HO

D is the discharge per second
 A the area of the cross section and
 V the velocity.

The velocity depends on the slope of the water level, the shape of the cross-section, the nature of the soil, etc., etc., and is expressed by the following formula:—

$$v = c\sqrt{R \times i} \quad \text{in which}$$

c is a coefficient which depends on the nature of the soil; its value is about 50.

R is $\frac{A}{C}$ that is
 the area of the cross section
 wetted cross section

i is the difference in height over a distance of 1 meter or in this case 0.00024.

We find consequently that:

$$D = c \times A \sqrt{\frac{A}{C} \times i}$$

By assuming that the proportion of the average depth and width of the river is as 1 to 50, we are able to determine the area of the cross-section.

If h is the depth then the width is $50h$. Substituting in the formula all the items that are known we find

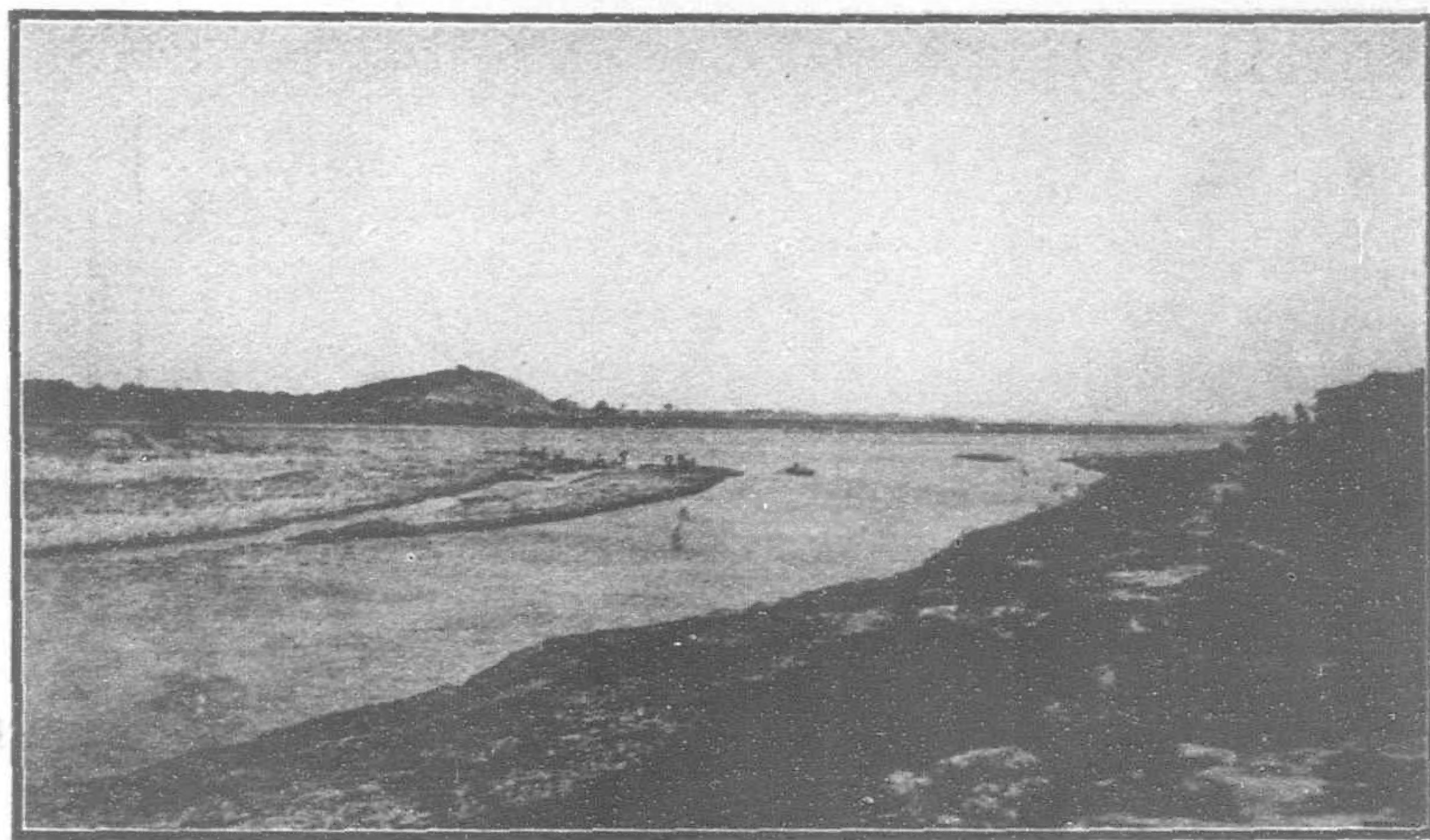
$$130 = 50 \times 50h^2 \sqrt{\frac{50h \times h}{50h} \times 0.00024} \text{ or}$$

$$130 = 2500h^2 \sqrt{0.00024h}$$

$$16900 = 6250000 h^4 \times 0.00024 h$$

$$h^5 = \frac{16900}{6250.000 \times 0.00024} = \frac{169}{15}$$

$$h = 1.60 \text{ m about}$$



WHERE THE TA-CHING HO JOINS THE YELLOW RIVER

Consequently the T'oung Sze Ho should have, in order to be able to carry down 130 cub. m. of water to the Tu Shang Hu per second, an average depth of 1.60 m. by a width of 80 m.

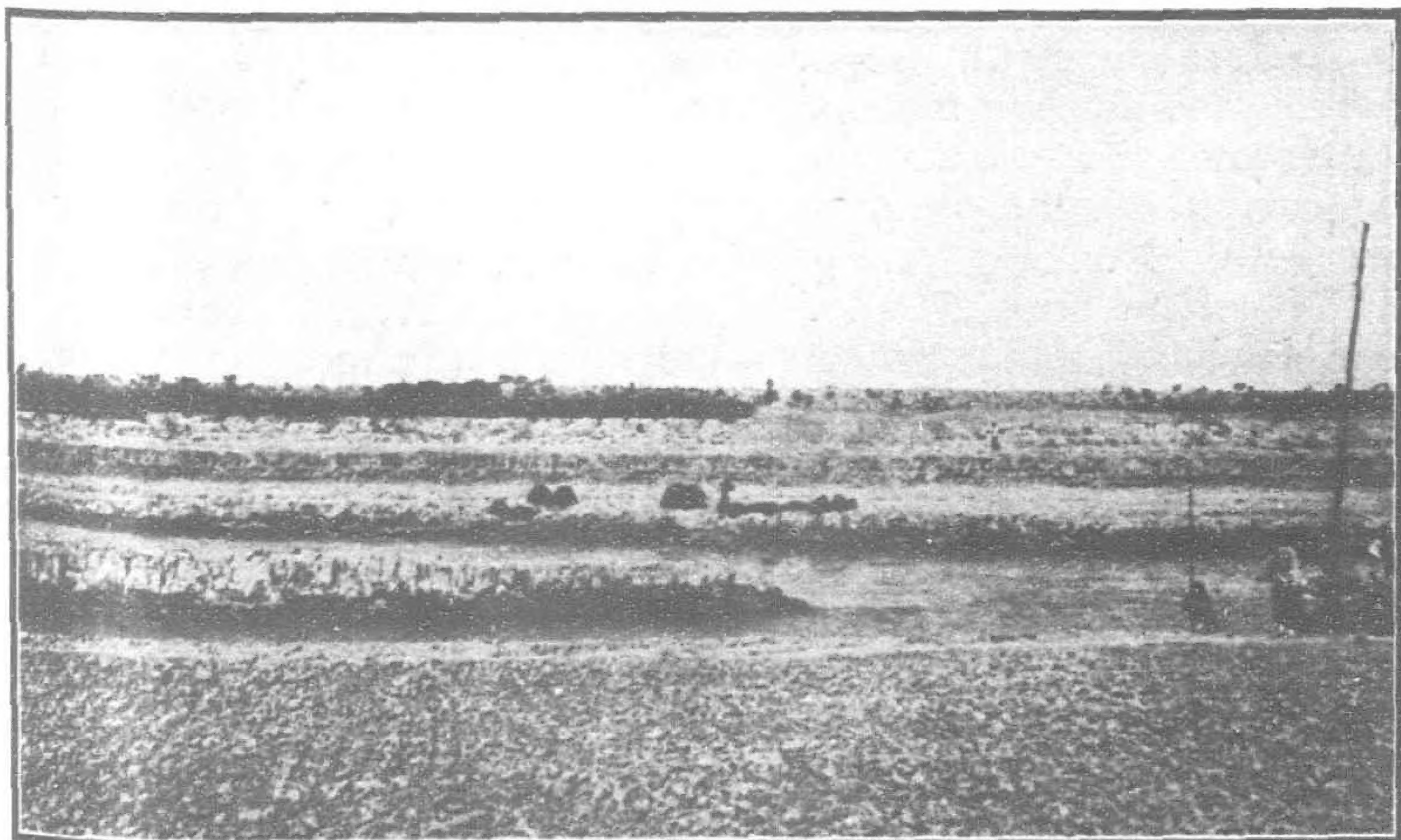
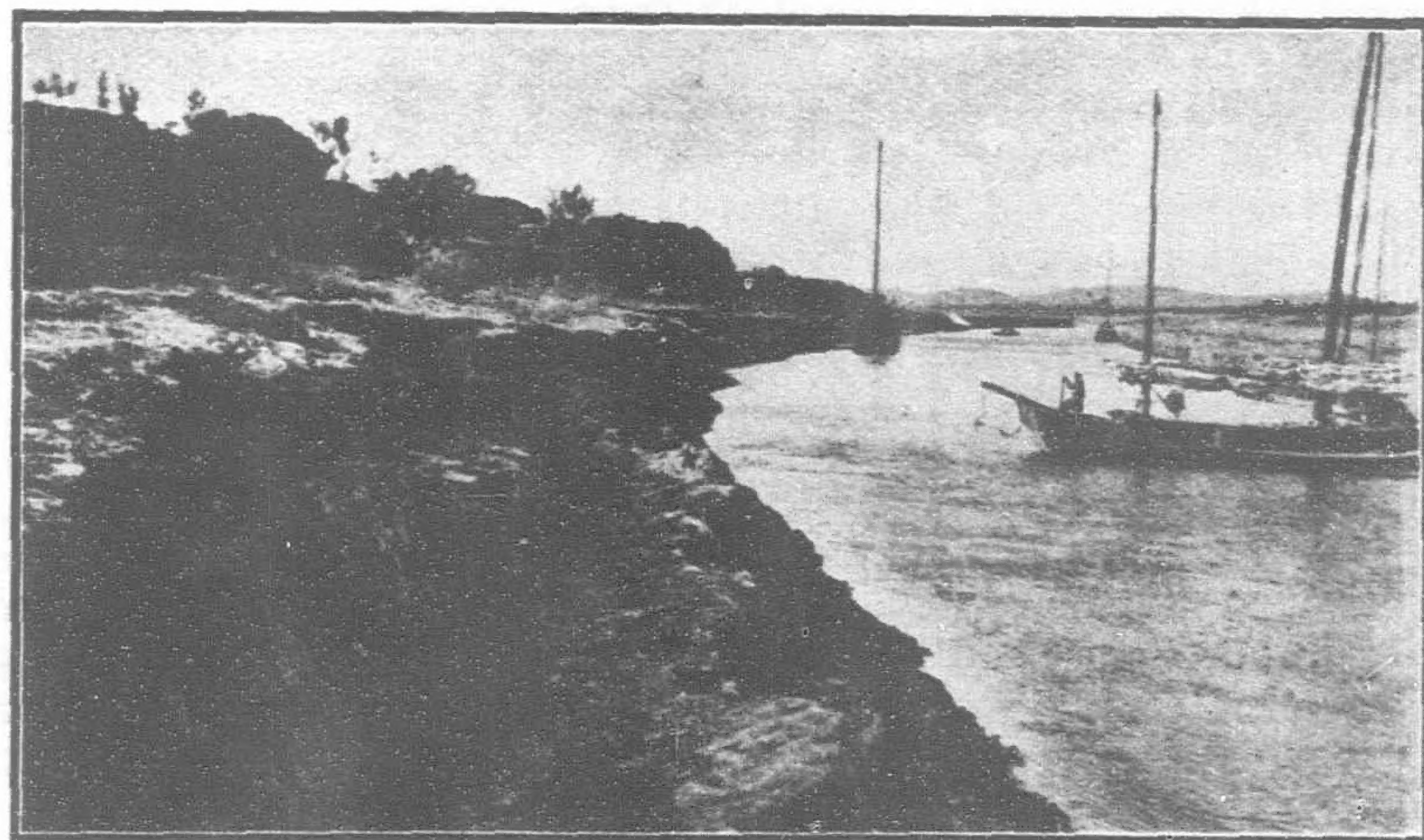
The Niu To Ho.—In the report on the Grand Canal improvement scheme by Mr. Pan, I find that the length of the Niu To Ho from Mang Tchong back to Wang Kwei Tuen is 36 KM. and the difference in elevation only 2.35 M. This works out to a very gentle slope of 0.000065 M. per Meter length and the velocity would be therefore only very small so that a large cross-sectional area would be necessary to deal with the discharge of the Wen Ho efficiently.

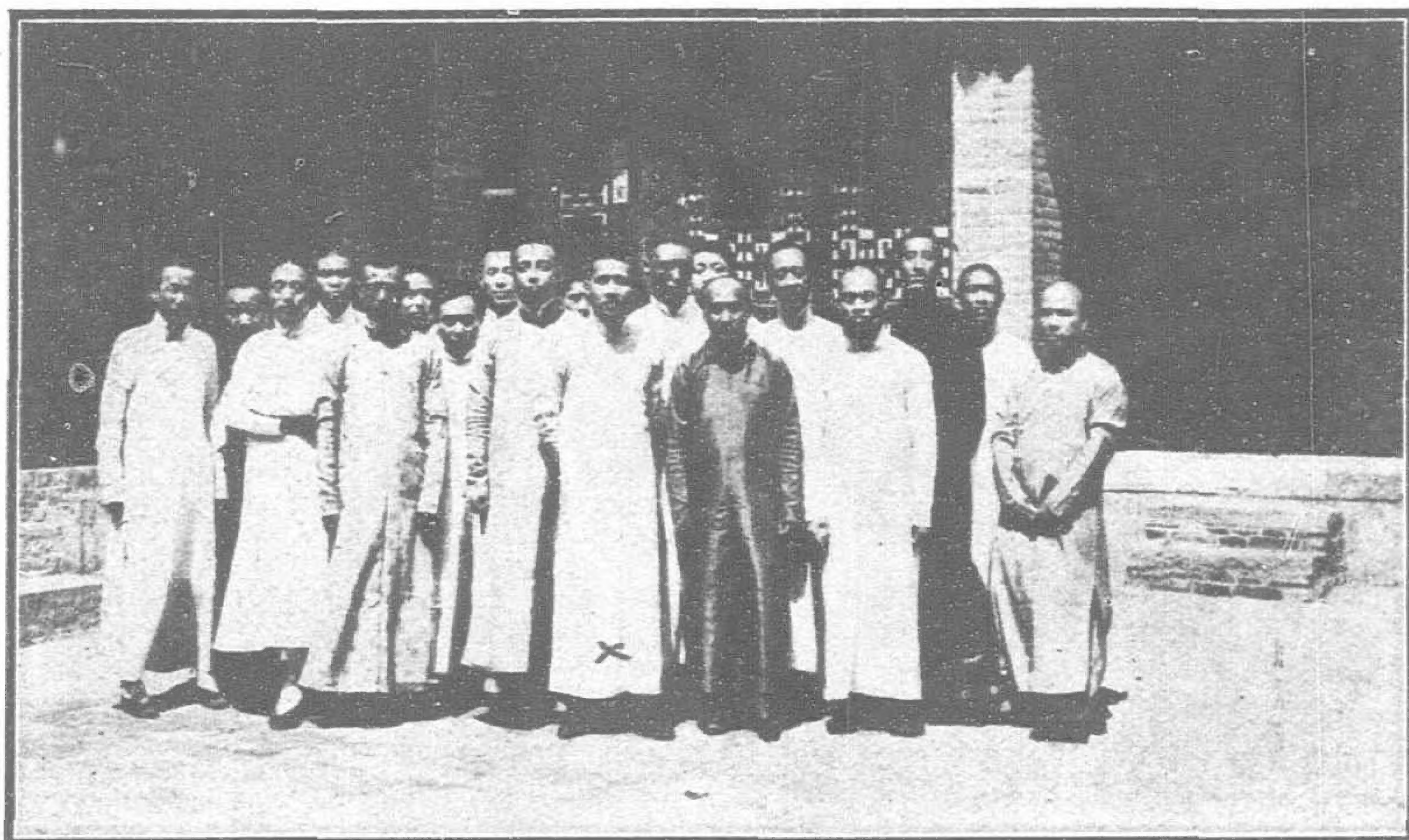
In this case we would find

$$h^5 = \frac{16900}{6.250.000 \times 0.000065} \text{ or } h = 2.80 \text{ M about}$$

A canal with an average depth of 2.80 M. and 140 M. width would consequently be necessary to cope with the amount of water from the Wen Ho.

I think however that the conditions are a little more favourable for the following reasons: Probably the difference in elevation of 2.35 M. referred to is relative to the bed of the Niu To Ho, and although usually the slope of the water-level of a river is about parallel to the slope of its bed, this is not always necessary. In this case the difference in height of the water-level at each end is considerably more for the connection between the Wen Ho and the lake is not only the Niu To Ho from Mang Sheng lock to Wang Kwei Tuen, but begins already at the Grand Canal. Now if we have a look on the drawing showing the oscillation of the water-level in the Grand Canal, we see that during the low water stage the water at Fen Swei Ko is at 28.50 M. and near Hsu Chia Ying Fang at 33.50 m. As the communication between this place and the Wang Kwei Tuen is very wide, we may safely assume that the height of the water-level will be the same and consequently the difference in elevation of the water-level in the connection between Wen Ho and the lakes is

LOWER END RAPIDS NEAR THE MOUTH OF THE TA-CHING HO.
THE FORMATION OBSERVABLE IS MUDTA-CHING HO EMBANKMENT NEAR THE YELLOW RIVER, SHOWING
THE EFFECTS OF EROSION



STAFF, SOUTH GRAND CANAL IMPROVEMENT WORKS, AT TSI NING-CHOW.
(X) PAN, DIRECTOR OF THE SOUTH GRAND CANAL IMPROVEMENT
BUREAU, SHANTUNG

roughly 5 m. The length of the Niu To Ho has, however, been increased also and is not 36 H.M. but 48 H.M. The average slope is under those conditions 0.00012 and applying again the formula before used we find that:

h 1.86 m. and the width consequently 93 m.

But this is of course only where the bed of the river is at the required depth below the adopted water-level. In case the river should be less deep it has to be made deeper, but if the river should be too deep it cannot be altered. In such places, (in this instance near the Grand Canal) the cross-sectional area would with the same width therefore be larger than required and consequently the velocity would be smaller, but as the velocity depends on the average slope this slope would be less also. This would upset the entire calculation and we will therefore have to decrease the area of the cross-section. This can be done by making the channel more narrow.

Suppose that the bed of the river is not 1.86 m. but 2.86 m. below the assumed water-level. In that case we get roughly the corresponding width as follows:—

The slope of the water-level remaining unaltered the velocity is constant also, and so is the cross sectional area, from which it follows that:

$1.86 \times 93 \text{ m.} = 2.86 \times W$ in which W is the corresponding width or $W = 60 \text{ m.}$ about

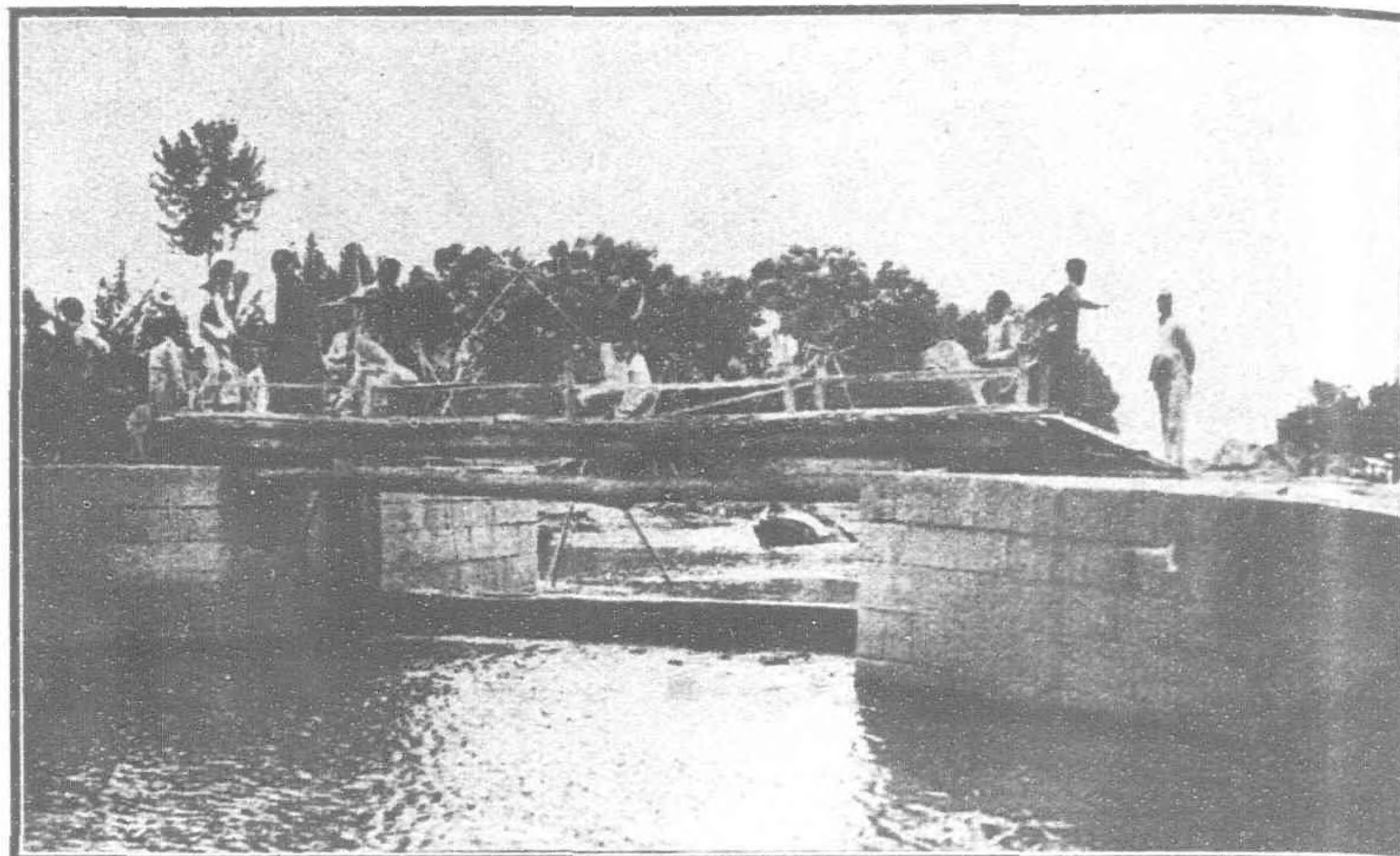
From the lakes towards the Grand Canal near Fen Suei Ko the Niu To Ho should therefore, in case a uniform slope of the water-level is adopted, become more narrow as its depth increases.

As the necessary data, that is levels, etc., are not available as yet, it is impossible to say whether a canal as above contemplated is feasible. I say therefore once more and I should like to have this clearly understood, that the above calculations are only to be considered as an illustration and an attempt to get a rough idea of what has to be done.

Ta Ching Ho & Yellow River.—I have already in former pages explained why the Yellow River has such a detrimental influence on the discharge of the Ta Ching Ho and that the only way to improve the situation was to prevent the silt of the Hwang Ho entering the mouth of the Ta Ching Ho.

Is this possible?

Again the answer has to be postponed until the survey is finished and the data are collected, specially tide gauge readings, records which should be kept carefully. If it should appear that the water level in the Ta Ching Ho is often higher than the Yellow River, so that by an open channel the Ta Ching Ho could have a proper discharge, then it is worth while to study the question more carefully, but if on the other hand the opposite should be the case, it is useless and the question may be safely dropped. But even if the tide gauge records should prove that a proper discharge of the Ta Ching Ho by an open mouth could be possible the question of disposing of the Hwang Ho silt remains and this is a very difficult problem, which I am afraid could not be solved without heavy pecuniary offers. With reference to this, it is consequently advisable to ascertain first



LOCK ON THE GRAND CANAL

whether a general improvement scheme is possible without touching the afore-mentioned delicate problem.

The Outlet of the Storage Basins.—The only outlet of all the storage basins is the Grand Canal, which is connected with the Wei Shan Lake by the Han Chwang Hu Ko double locks with a total opening of 13.80 M. The capacity of this canal as a conveyance for water is, as I already said elsewhere in this report, very small, especially during the summer time, when the Ye Ho brings large amounts of water into the Canal and it is therefore only able to cope with the quantity of water which is stored up in the lakes over a longer period.

In case the conditions of the Grand Canal below the Wei Shan Lake could be improved in such a way that during the rainy season its discharge capacity could be equal to that in the winter, it is evident that the water-level in the lakes could either be kept lower during the whole summer or at least for the greater part of it, which would greatly benefit the drainage of the low lying country. That this is of very much importance goes without saying, and it would therefore be very good if the Ye River could be more independent of the Grand Canal. It would be desirable if this work could be taken in hand simultaneously with the South Grand Canal improvement in Shantung.

Financial Side of the Scheme

It is contemplated to defray the costs of the scheme out of the taxes to be levied on the reclaimed land at the rate of \$1 per Mow, which would altogether amount to \$826,000 per year. If this estimate, which is as I take it only a rough guess, should prove to be correct, it is possible to improve the conditions thoroughly and the productiveness of the scheme is then certain.

It is however at present not yet possible to say exactly which land and how much can be reclaimed as (which I have said before) first the survey and the levelling at least has to be finished, notwithstanding which, the general impression I get is that the scheme will pay for itself entirely.

Conclusion

Before ending this report I would like to say a word of appreciation on the manner in which the South Grand Canal Conservancy Bureau has, under the able Directorship of Mr. F. Pan carried out the preliminary survey and everything connected therewith. Not only have good maps been made, but accurate levellings have been done as well, tide gauge records have been kept, discharge measurements taken, in short, almost everything has been done which is necessary to serve as a sound basis, without which no proper plan can be made. Here and there some fault may be found, but not serious, or the data collected may fall short of the required standard of accuracy, but considering the little practise which the staff had the opportunity of obtaining the Bureau undoubtedly deserves the highest praise and has to be congratulated upon the work it has performed.

It is sincerely to be hoped that the Bureau will be enabled by the Central Government to continue its task for which it wants more funds in order to accomplish all the necessary work on which a definite scheme can be based, a scheme which promises all possible success.

RESTORATION OF MONARCHY IN CHINA

The Revolt of the Republicans

The record of the progress of events connected with the restoration of the monarchical system was closed in our last issue without any definite details being given of military movements. This was necessary because reliable news came to light very slowly, while rumours were numerous and conflicting.

As soon as it became evident that the Yunnanese troops seriously intended to fight for their "independence" the Government pushed on with its arrangements to dispatch a large number of troops from the north. The general plan of operations was to attack Yunnan with three armies. The first army under the command of General Tsao Kun, was to co-operate with the troops of Szechuan; the second army under the command of General Chang Ching-yao was to co-operate with the troops of Hunan, while the third army was to be under the command of General Lu Yung-ting, Military Governor of Kuangsi. It should be mentioned that the attitude of the province of Kueichow, which lies to the north of Yunnan, remained obscure until January 27 when it was announced that the officials there had decided to throw in their lot with Yunnan. Whether this decision was voluntary or compulsory is not clear.

The transfer of troops from the north to the scene of operations was necessarily slow, as from Hankow they had to be transported by river to Chungking, which was selected as headquarters. In the circumstances it is not surprising that the aggressive was taken by the Yunnanese troops, who invaded Szechuan. The first actual fighting appears to have taken place near Anpienchen in Szechuan, about thirty miles from Suifu. No definite information is available in regard to the numbers of either the Yunnanese or Szechuan troops, but success was certainly gained by the former, and it is said that the casualties sustained by the Szechuan troops totalled 300. About January 21 the Yunnan troops reached the city of Suifu on the Yangtze River, and occupied it, the loyal garrison withdrawing north of the river. In the meantime loyal troops were on the way up the Yangtze to Chungking but slow progress as already stated was being made owing to the difficulties of transportation. Later reports indicated that the Yunnanese were pushing on northwards to the rich salt well district of Tzeliutsing, with the object of obtaining contributions from the wealthy salt merchants. Other troops were said to be proceeding down river to Chungking, hoping to reach that Treaty Port before the loyal soldiers. How many troops the Yunnan leaders sent to attack Szechuan is not known. In fact no accurate estimate of the number of men in arms in Yunnan is available. There are various estimates, but 20,000 should be somewhere near the mark, with recruits being knocked into shape to make up wastage. As to the troops in Szechuan it is estimated that there are about 17,000 in the province, 6,000 at Chungking and 9,000 at Chengtu, while the rest were in scattered garrisons. A telegram from Chengtu dated January 27 officially stated that the arrival of northern troops at Tzeliutsing had relieved the salt district from danger.

After the occupation of Suifu the Yunnanese leaders sent forces to attack Luchow. This is an important city situated about mid-way between Suifu and Chungking, on the northern bank of the Yangtze River. If the Yunnanese could have gained possession of this city they would have been in a very good position to attack Chengtu, the capital of Szechuan, and to menace the communications of any force advancing to its relief from Chungking. The distance from Chungking to Luchow is somewhere about 120 miles. On several occasions it was reported that the republican troops had occupied Luchow, but these rumours were officially contradicted. The concentration of northern troops at Chungking steadily progressed and as their numbers were augmented the prospect of the Yunnanese securing Chengtu, which would have had an immense moral effect, grew steadily less.

Definite information about the movements of General Lu Yung-ting's army has been slow in forthcoming. An engagement, in which the loyalist troops were successful, took place at Loping in Yunnan, about twenty miles from the Kuangsi border. Later a report was in circulation that the loyalists had occupied Mengtsze, a treaty "port" on the Haiphong-Yunnanfu railway, but subsequent information showed that this news was at least premature.

Early in February the first news of marked activity on the part of the loyal troops operating in the Szechuan sector was received. A force of Szechuan troops under General Fung Yu-tsiang met the Yunnanese on January 31 about fifty li northeast of Suifu. An engagement ensued that lasted for several hours. The Yunnanese were defeated and sustained casualties estimated at from 300 to 500, including several officers. The loyalists took a number of prisoners, and captured two mountain guns and large quantities of munitions. After this success General Fung Yu-tsiang advanced towards Suifu to endeavour, in co-operation with other loyalist troops, to expel the republicans from that city.

On February 7 some news was received from the south of a disquieting nature, as it showed that the position had to be accepted that Kueichow was actually co-operating with the Yunnanese. The official report stated that the city of Kueiyang had been invaded by a force under Tai Kan which was joined by a portion of the local garrison. Tai Kan, it may be remarked, is a native of the province of Kueichow. Whether there was any fighting in connection with the seizure of Kueiyang is not clear, but it seems probable that there was not. Subsequently a force of about 1,000 men, stated in some reports to have been Kueichow troops, raided the city of Huangchow on the Hunan border. The official report states that there were no loyalist troops at Huangchow, and declares that the raiders after burning down government buildings, looted the city of all food-stuffs.

On February 8 Liu Hsien-shih, Military Commissioner of Kueichow, was cashiered.

A telegram from Chengtu, dated February 7, stated that with the exception of Suifu, all cities in Szechuan north of the Yangtze were in the possession of the Government troops, while telegraphic communication with Chungking had been restored.

Turning from the military situation for the moment, it is worthy of note that among the memorials received towards the end of January urging the Emperor to ascend the Throne with the least possible delay was one from General Chang Hsun. Rumours had been spread that General Feng Kuo-cheng and General Chu Jui, the Military Governor of Chekiang, had presented a memorial urging the establishment of a sort of Imperial Federation in China, namely the formation of a number of feudatory principalities. The object of spreading this rumour was obviously to inspire a belief that instead of obtaining a constitutional government the country was threatened with the worst kind of autocratic rule. Flat denials were at once published by both Generals that they had submitted any memorial of the kind indicated. This, however, is only one of the innumerable baseless reports which were put in circulation, most of which originated from Japanese sources. Most of them related to stupendous victories alleged to have been gained by the republicans, and to serious outbreaks which were said to have occurred in Mongolia, Turkestan and several of the provinces. Almost invariably these reports were found to have no foundation in fact, or, when they had some foundation to have been grossly exaggerated. Among the most picturesque of these sensational reports was one which had its origin in the arrest of a minor Palace official on a charge of disclosing official secrets. This was magnified into the discovery of a plot to assassinate the Emperor-elect and the most circumstantial details were given of

the finding of bombs in the Palace. It was even stated that one of the Emperor-elect's sons was concerned.

If there was nothing spectacular in the operations of the loyalist troops against the republicans in the early stages, they were at least methodical. Instead of inviting, or at any rate risking disaster by premature offensive action with inadequate forces, the wise policy was adopted of mobilising a sufficiency of loyal troops before undertaking any major operations. At the same time care was taken that localities, important strategically or in other ways, should not be allowed to fall into the hands of the republicans, and, with this object in view, several minor actions were fought. In these, according to the official reports, the Yunnanese were invariably defeated with heavy losses, while many of their mountain and machine guns were captured. There is little doubt that the republican leaders thought that they could gain possession of Tseliutsing, where the salt wells are, and, perhaps, of Chengtu, the capital of Szechuan province. Sufficient loyal forces were employed to frustrate the attempt to gain possession of these places, but, as already stated, the real offensive on the part of the northern troops was delayed until all the necessary preparations had been made. When the safety of Tseliutsing, Chengtu and Luchou was assured the northern leaders were able to develop their plans at leisure. With stronger forces and infinitely greater resources, time was on their side. The only hope of the republicans was to achieve an early dramatic success that might bring waverers to their aid. This they could not accomplish, and their failure undoubtedly lost them assistance upon which they had counted.

Some interest and not a little resentment was caused by the reproduction in the Peking newspapers of February 10 of a "manifesto" issued by the members of a propagandist organization formed by Japanese residents in the Chinese capital. The manifesto appears to have been sent to Tokyo and to have been published there in some magazine, copies of which found their way to Peking. The ostensible object of the persons by whom the manifesto was issued was to stir up their Government to take "strong action" in China. They urged that the Western Powers were unable to interfere whatever policy Japan chose to adopt in regard to China, and that the unique opportunity should be ruthlessly seized. After indulging in much unmeasured abuse of Yuan Shih-kai, the framers of the manifesto recommended that a third Note of Advice in regard to the re-establishment of the monarchical system should be presented to China. This would result, they pointed out, in loss of prestige by the Central Government and consequent encouragement to the revolters, and it might reasonably be expected that China would be thrown into a state of chaos. Then Japan's opportunity would come. That was the gist of this precious manifesto. While it would be unwise to attach too much importance to the utterances of men who may or may not reflect the opinions of the bulk of their countrymen, it would be still more unwise to ignore the fact that the policy advocated by them has found support in much more influential quarters, though not expressed with such brutal frankness. Undoubtedly there are a good many Japanese who see no immorality in a breach of treaty undertakings by Japan if it can be committed with impunity. Whatever the significance, or insignificance, of the manifesto its publication caused much resentment among the Chinese, by whom it is taken as collateral evidence that the revolt in Yunnan is not regarded by Japan as altogether displeasing.

On February 13 a Mandate was issued which confirmed rumours which had been in circulation of the defection of General Liu Cheng-hou, commanding the 2nd Division of troops. The Mandate states that Liu was sent with one brigade of the 2nd Division to defend the city of Yungning, but instead of doing so he inspired his troops to revolt and assisted the Yunnanese in their designs upon Luchou. The attempt to surprise Luchou failed, and after a vigorous attack by the Government troops the republicans fled. For his disloyalty, the Mandate concluded, Liu must be cashiered and executed as soon as captured. Further information in regard to the attack on Luchou was given in an official report issued by the Wai Chiao Pu (Foreign Office) on February 15. It stated that, knowing that a large portion of the loyal troops stationed at

Luchou had been sent to attack Suifu, Liu, in conjunction with Yunnanese troops, attempted to take Luchou by surprise on February 2. He took Lan Tien Pa on the southern bank of the river opposite to Luchou, on the 5th. The next day, however, the loyal garrison at Luchou received reinforcements. On February 8 the republican troops crossed the river at Lohanchang and for three days and nights a fierce battle went on. The republicans were eventually driven across the river, Lan Tien Pa and Tai Ping Chang were retaken by the loyalists and the republicans retreated to the south. The latter sustained heavy casualties and lost six heavy guns.

After the official announcements in regard to the fighting in the vicinity of Luchou no news of importance was forthcoming for some time. The arrival of General Tsao Kun, the Commander-in-Chief of the loyalist troops, at Chungking on February 15 effectually disposed of the rumour circulated by republican sympathizers that that important city had declared its neutrality. Some fighting is said to have taken place near Chikiang, which is on the southern bank of the river opposite Chungking, but no authentic information has been received at time of writing. The one definite conclusion to be drawn from the reports received from all sources up to February 15 was that the forward movement of the republican armies has been arrested.

Towards the end of the month it was announced that the Government had provided for a force of 100,000 men to suppress the rebellion and that arrangements had been made for a campaign of six months. The estimated cost was \$30,000,000 of which \$20,000,000 had already been provided for in the Budget. The balance would be obtained either from a loan or provincial contributions.

Fighting occurred near Nashi on February 18 which resulted in the loyalists capturing all the hills outside of the city except one. The republican troops are said to have suffered very heavy losses.

On February 25th, after a sharp encounter with the Government troops near Nashi in which the republicans suffered severely, they retreated. A detachment was almost exterminated in crossing the river. The following day a portion of the republicans advanced toward Tungshih but were met by Government troops and forced to retreat with heavy losses. Severe fighting took place again on the 26th near Nashi which resulted in the capture of the second line of the republican defences.

Nothing further has occurred in the Suifu region where the republicans are entrenching on the mountain ridges. Upwards of three hundred wounded Government troops are in the hospital at Luchow. A big battle is expected to take place as soon as General Tsao Kun starts his Westward movement.

Although it was generally understood that the enthronement ceremony would not be proceeded with, no official announcement of its definite postponement was made until February 23. A Mandate was issued on that date, inspired perhaps by the presentation of a Memorial from Prince Pu-lun and others urging the Emperor-Elect to ascend the Throne without delay. The translation of the Mandate published by the *Peking Gazette* read as follows.—

Telegraphic and written petitions and prayers have been received from civil and military officials, representatives of the citizens, various organisations as well as individuals, urging that the Throne be ascended at an early date. This has been proceeding almost daily. To the patriotic people these acts are intended to secure to the country a permanent peace, but on the part of the Person holding power, HE has the responsibility of looking into the general situation and acting with wise judgment. The provinces of Yunnan and Kueichow are raising rebellion; and the homes of many are disturbed. The conditions of people living in western Hunan and southern Szechuan, where the robbers have raided, are pitiful to hear, they having lost their homesteads. The painful thought caused by the sufferings of my people has disabled us from enjoying our sleep and food. In addition to this the unscrupulous have invented rumours of a most fantastic character. Our original intention to save the country and the people has unfortunately been made a subject of quarrel for privileges and rights. How can our heart be at ease if we should ascend the Throne at this moment? We are now resolved that this question must be postponed. It is presumed that all patriots will readily understand our decision. Hereafter all telegrams and memorials praying for an early accession to the Throne shall not be allowed to be presented. Let this be universally proclaimed.

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CONSERVANCY WORK IN CHINA

In this issue we publish the report of Mr. H. Vanderveen, the Consulting Engineer to the Chinese National Conservancy Bureau, on the scheme for the improvement of the Grand Canal in Shantung Province, and a paper by Mr. H. von Heidenstam on China's Inland Waterways. These matters are of such immediate and far-reaching interest to China that we need make no apology for publishing the papers at length. Especially is this so since Mr. Vanderveen's report was responsible for a reconnaissance of the territory included in the scheme being made by Mr. W. F. Carey, of the firm of Siems & Carey, of Minneapolis, with a view to ascertaining whether the work is actually practicable or not. If Mr. Carey decides that the work can be profitably carried out it is likely that the Government will enter into a contract for a loan to put the scheme into effect.

This is an important development of the plans made by the Government sometime ago. The Government has for quite a considerable time been investigating the neglected waterways of the country and in 1914 formed a Conservancy Bureau to undertake the necessary labors in this connection. On January 12, 1915, too, a mandate was issued instructing the various Conservancy Bureaux to consult with the National Conservancy Bureau with regard to any conservancy problem that may require consideration. The mandate further pointed out: "It is our aim to have all the water courses of the country take the form of the blood system with the veins and arteries doing their respective work properly and scientifically—every stream with a proper outlet and a proper slope," which is conclusive proof that the Central Government has been and is fully alive to the necessity of giving attention to this matter. In a letter to a contemporary Mr. Vanderveen supplied some facts which are of interest. Early in 1914, he pointed out, the Government, being fully aware of the necessity and importance of doing something to their badly neglected waterways, established the National Conservancy Bureau, of which His Excellency Chang Chien was made Director General. Sub-bureaux were established in several Provinces, the best known being those in Kiangsu and Anhui on account of their connection with the survey of the Huai River flood district, a survey which enabled the Board of American Red Cross Engineers during their short stay in China in the summer of 1914 to formulate a general plan of improvement. Other bureaux were formed without connection with the Central Bureau, one being the National Conservancy Bureau. As the Government feared that this might lead to disjointed effort the mandate referred to above was issued to consolidate and unify all conservancy matters under the Central National Bureau. Active work has since then been undertaken, and surveys of various localities have been made. Investigations have been carried on in connection with the Huai River scheme, one of the most important in China; the West River territory in South China, the Grand Canal, and the Sea-wall at Hangchow. Particularly has much work been done by the South Grand Canal Improvement Bureau in Shantung. This Bureau has dealt with the work outlined in the report by Mr. Vanderveen, which we publish. In addition to these problems numerous others have been having full attention and methods have already been devised for collecting the necessary data for improvements.

The conditions obtaining in China have of course materially affected the consummation of several desirable plans, and the chief among the factors making for delay is the shortage of finances. It is wrong, however, for any one to believe that the Chinese do not appreciate the value of conservancy work. The tremendous schemes for flood control and land protection which now exist is the answer to skepticism. For over forty centuries the Chinese have been building dykes and using canals. Important work that has been done, as was pointed out in a recent article by Mr. C. D. Jameson, is that in connection with the Yangtze and Yellow River systems. He says that it may be taken as a fact that all of the rivers flowing through the delta plain have their waters more or less confined by dykes from where they enter the plain to the sea. This applies to the Yangtze River, from near Ichang, for one thousand miles; to the Han River for four hundred miles, until it enters the Yangtze at

Hankow (these Han dykes are on both sides of the river, and in places are thirty feet high); to the Yellow River from Meng Hsien to the sea, about three hundred miles; and to all the other rivers entering this great delta plain of the north or the delta plain around Canton and Southern China.

In addition to the dyking of the rivers, the delta from Hangchow on the south to Tientsin on the north—eight hundred miles—is a network of canals for a width of one hundred to one hundred and fifty miles west from the sea.

Within the area from Ningpo to the Yangtze, one hundred and eighty miles, and from the ocean west some one hundred and sixty miles, there are over twenty-five thousand miles of canals,* great and small; and none included are so small but that two small native boats may pass each other.

From the Yangtze north to the old bed of the Yellow River and east of the Grand Canal, one hundred and twenty miles by one hundred and thirty miles, there is a similar network of canals. North of the old bed of the Yellow River, it extends to the borders of Shantung, and north of Shantung, to Peking, with a diminishing number of canals. In this great delta plain of the Yangtze and Yellow Rivers there are not less than sixty thousand miles of canals for transportation which also serve for irrigation, drainage, and flood control.

As protection from the ocean tidal waves, there are, south of the Yangtze, some three hundred miles of sea wall; and from the Yangtze north, for over one hundred miles, the great Maritime Dyke, built in 1027 A.D.

More work has probably been done and more money expended upon flood control during the last two thousand years in and for the section of country east of the Grand Canal and from the Yangtze River north to the old bed of the Yellow River, than in all the remainder of China.

This is a low, flat section but a few feet above sea level. The soil is very rich and the climatic conditions suited to the culture of rice and wheat. Bordering on the Grand Canal and being covered with a network of secondary canals, it has been in touch with China's markets for three thousand years. Not only was it the granary of China, but the whole sea coast was and is one vast salt manufactory. And it is still upon this section that continued effort and money must be expended. For many years the main canals have been neglected and rivers have silted, the effect being that tremendous areas of country have been put out of cultivation and have deprived millions of people of secure homesteads and farms. The recent attention which has been given to the Huai River and Grand Canal areas has awakened officials to the necessity of action and it is gratifying to see that steps are now being taken to effect improvements which will be of material benefit to the country at large.

THE CHINESE MIDDLEMAN AND TRADE IN CHINA

The prospect of intensified competition in the commercial field of China after the war has caused considerable attention to be paid to the methods by which business has been conducted in the past. The British, officially and unofficially, have been particularly energetic in seeking out the faults in their own methods and the strong points in those of their rivals, with the object of correcting the one and adopting the other. In this connection much valuable work has been done by Mr. T. M. Ainscough who, in the capacity of Special Commissioner to the British Board of Trade, travelled over most of the great trade routes in China investigating conditions and studying the methods by which business is carried on, particularly in relation to foreign trade. A similar service has been performed for America by Mr. Arnold, but he was more directly interested in

trade possibilities than methods, though he has made many excellent suggestions in regard to the latter. To his work Mr. Ainscough brought a trained mercantile mind, that is to say he has himself been a merchant, and was consequently thoroughly competent to offer practical suggestions after completing personal investigations. The recommendations that he makes for the promotion of British trade in China deserve careful study by every nation that is interested in the field.

Great stress is laid by Mr. Ainscough upon the elimination of the Chinese middleman. Under existing conditions this is the counsel of perfection. The Chinese middleman cannot be at once eliminated simply because there is no one to fill his place. The number of foreigners who possess a knowledge of the Chinese language and who understand the intricacies of Chinese trading methods and of inter-provincial transport and other dues is extremely small. Until that number be considerably increased the Chinese middleman will continue to be an essential if any business at all is to be done. It is true that the system of indirect trade is costly and an undoubted impediment to business expansion. Though the foreign merchant and the Chinese middleman are working together, their interests are not identical, in fact they are not infrequently in conflict. Cases have been known of the middleman buying for himself from the foreign merchant at a low figure in order to sell at a much higher rate to a waiting customer. In existing circumstances that sort of thing cannot be checked, and it should be said in justice to the middlemen that there have been but few recorded cases of direct spoliation by middlemen of their foreign partners—it is to be understood that the word partners is only used in the restricted sense applicable to the association between the foreign merchant and the middleman. The fact that the interests of the parties are not identical is, however, calculated to prevent trade from being pushed with the vigour and determination that can be shown when direct contact with purchasers or sellers can be established.

Another important suggestion is the organization of buying and selling in the interior. This is obviously highly desirable, but again the lack of a sufficient staff acquainted with the language, customs and business methods of the Chinese is a bar to its immediate adoption. That more business and better business would result from its being sought at the fountain-head, so to speak, is certain. The German is the only business community in China that realized from the outset that trade could only be satisfactorily developed by getting into direct touch with principals and by organizing marketing in the interior. That fact having been realized the German firms took the indispensable preliminary step of compelling their foreign staffs to learn the Chinese language and to study the character and customs of the people. It may safely be asserted that a larger proportion of German commercial men in China have a knowledge of the language and the tastes of the people than those of any other nationality, though it must not be forgotten that the staffs of the British-American Tobacco Company and the Standard Oil Company also include many members who have qualified themselves for direct trading. But, although the Germans have achieved a considerable degree of success in their efforts to emancipate themselves from the thralldom of the Chinese middleman, they have not been able to dispense entirely with his services.

A consideration of the situation in the light of the known facts compels the conclusion that it will be a long time before direct trade can become general. Although there is reason to believe that the difficulty of learning the language has been magnified, and that faster progress will be made by the new and improved methods of teaching that have been evolved, the creation of a large staff of qualified foreigners will take many years. The steps that are being taken to establish schools for the exclusive use of foreigners engaged in commerce will undoubtedly be of ultimate benefit, but it must be recognised that for a considerable time to come indirect trading must continue. In such circumstances it might be worth while to cast about for some means whereby closer association and identification of interests of foreign merchant and Chinese middleman could be devised. The formation of Sino-foreign companies and partner-

* See article on "National Irrigation and Conservation in China" in the FAR EASTERN REVIEW, January, 1914.

ships immediately suggests itself. In the past the difficulty created by the extra-territorial status of the foreign merchant has been a serious obstacle and moreover there has been no satisfactory Chinese company law. This latter deficiency has been largely rectified since the present Minister of Commerce, Mr. Chow Tze-chi, took office, and the reform of the judiciary that is being carried out should soon render it possible for Sino-foreign companies and partnerships to carry on business successfully. If this is found to be feasible the elimination of the middleman will be quickly accomplished by transforming him from an intermediary to a partner.

JAPAN'S RAILWAYS AND TRAMWAYS

In order to unify the arrangements of transportation in Japan and promote its economic advantages, the Government, according to the Railway Nationalisation Law issued in March, 1906, purchased the lines belonging to seventeen Railway Companies, namely, the Kobu, Hokkaido-Tanko, Ganyetsu, Nippon, Nishinari Sanyo, Kiushiu, Hokkaido, Kyoto, Hankaku, Hokuyetsu, Sobu, Boso, Nanao, Tokushima, Kwansai, and Sangu. Their aggregate mileage on the day of purchase was 2,823 miles, and the total amount of loan bonds delivered to the private railway companies as purchase-price was *yen* 476,318,800 (£48,788,159), which was completely paid on the last day of July, 1909.

The working of the Japanese Railways during the year 1913-14 gave according to the Financial and Economic Annual of Japan, the following results:—

Of the aggregate mileage worked of 7,291 miles, 5,473 miles were represented by the State lines, and 1,121 miles by the private lines, and 697 miles by the South Manchuria Railway. The number of passengers carried was 211,251,883, and the tonnage of freight 47,063,324 tons, while the traffic receipts amounted to *yen* 138,577,754 (£14,194,177).

On the State lines, the average mileage worked for passenger traffic was 5,289 miles and for goods traffic 5,344.3 miles. The number of passengers carried was 167,773,143 and goods amounted to 36,348,362 tons. Traffic receipts were:—passenger *yen* 57,296,280 (£5,868,717); goods *yen* 53,737,253 (£5,504,174); sundries *yen* 2,443,522 (£250,284); total *yen* 113,477,055 (£11,623,175). The working expenses, interest on loans, etc., amounted to *yen* 92,932,740 (£9,518,871) and the net profit, after deducting the said items of expenses from the receipts, came to *yen* 20,544,315 (£2,104,303). The estimated receipts and expenses of the Imperial Government Railways for the financial year 1915-16 are, *yen* 128,118,447 (£13,122,856) for receipts and *yen* 110,279,742 (£11,295,682) for expenses, giving a net profit of *yen* 17,838,705 (£1,827,175); in these expenses is included *yen* 37,899,391 (£3,881,941), the interest on the public loans for the purchased railways, etc.

The Law relating to Light Railways was issued in April, 1910 and put into force in August of that year. The construction of Light Railways was formerly subject to various inconveniences, as it was practically regulated by the ordinary railway or the tramway regulations. It was to obviate this difficulty that the special measure was adopted. This legislative measure guarantees the profit of private light railways within a limit not exceeding 5 per cent. of the construction expenses.

The private and light railway companies open to business existing at the end of the year 1913-14 numbered 69 with the total open mileage of 1,121.07 miles and an aggregate capital of *yen* 77,439,222 (£7,931,908). They carried during the year 39,267,106 passengers and 4,237,637 tons of goods, while the traffic receipts and expenses were *yen* 7,135,516 (£730,873) and *yen* 3,808,433 (£390,088) respectively, leaving a balance of *yen* 3,327,083 (£340,785) as profit. The cost of construction of open lines amounted to *yen* 65,587,272 (£6,717,942).

The South Manchuria Railway Company was founded in July, 1906, with a capital of *yen* 200,000,000 (£20,485,507), of which *yen* 100,000,000 (£10,242,753) was contributed by the

Government with the real property, *yen* 60,000,000 (£6,145,652) was issued to the public, and *yen* 124,000,000 (£12,701,014) was paid up, *yen* 40,000,000 (£4,097,101) having not yet been raised. The total mileage of open lines at the end of 1913-14 was 697 miles, the total number of passengers carried in the same year was 4,211,634 and the total amount of goods was 6,477,325 tons. The total receipts amounted to *yen* 42,417,123 (£4,344,681) and expenses to *yen* 35,249,844 (£3,610,555), giving a net profit of *yen* 7,167,279 (£734,127). Of the above, the earnings of the railway came to *yen* 22,275,132 (£2,281,587) and its working expenses to *yen* 7,913,948 (£810,606).

The electric railways existing at the end of the year 1914 numbered 66 with an aggregate capital of *yen* 163,113,500 (£16,707,313), and the total mileage of their open lines was 691 miles and that of the lines not yet open 242 miles. The companies which have not yet opened business numbered 27 with an aggregate capital of *yen* 20,360,000 (£2,085,425), and the total mileage of their projected lines was 282 miles. In addition to the above, there were electric railways owned by the Tokyo, the Osaka and the Kyoto Municipalities with an aggregate capital of *yen* 136,629,177 (£13,994,589), the total mileage of their open lines being 120 miles and that of the lines not yet open 47 miles.

MINING IN JAPAN

The present Mining Law in Japan came into force in 1907; and by the term 'minerals' in that law are meant the ores of gold, silver, copper, lead, bismuth, tin, antimony, mercury, zinc, and iron, iron pyrites and chromite, manganese, tungsten, molybdenum, arsenic, and phosphorus ores, graphite, coal, peat, petroleum, asphalt, and sulphur. To other minerals, the above law does not apply, and as to alluvial working, a special law was established in March, 1909. By the term 'mining right' is meant the right of mining or prospecting for the above-mentioned minerals. The mining right can be enjoyed only by Japanese subjects and juridical persons constituted conformably to the laws of the Empire. The right of mining may be acquired with the permission of the Minister of Agriculture and Commerce, and the right of prospecting, with the permission of the director of a mine inspection office. The mining right is classed as real right to which the provisions relative to immovable property are correspondingly applicable; and it is indivisible. It cannot be made object of rights other than those of succession, transfer, measures taken in consequence of non-payment of national taxes, and execution; but the right of permanent mining may become the object of a mortgage. The duration of a right of prospecting is two years from the date of the registration thereof, but there is no limit of duration with regard to a right of mining. The area of a mining set must be, for collieries, not less than 50,000 *tsubo* and for other mines, not less than 5,000 *tsubo*, nor exceed for mines of all kinds 1,000,000 *tsubo*. In connection with this new Mining Law was promulgated in March, 1905 the Mining Mortgage Law, which enables owners of mining rights to create mining foundations with a view to the mortgage thereof. A mining foundation may be formed with the whole or a part of the following which belong in respect of mining to the same owner of a mining right:—

(1) Rights of prospecting and mining; (2) Land and works; (3) Superficies and right of using land; (4) Right of hiring things, to which the letter thereof has given his consent; (5) Machines, tools, instruments, vehicles, vessels, oxen, horses, and other appurtenances.

The total yield of mines in Japan Proper in 1914 came up to about *yen* 153,309,716 (£15,703,136), being an increase on the preceding year of *yen* 6,460,924 (£661,777). If we add to this the output of the Steel Foundry and the yield in Chosen and Taiwan, the total amount will come up to about *yen* 179,635,000 (£18,399,570) as follows:—

	<i>yen</i>
Japan Proper	153,309,716 (£15,703,136)
Steel Foundry	13,383,611 (£1,370,850)

Chosen	..	..	..	8,402,649 (£	860,663)
Taiwan	..	..	..	4,539,787 (£	464,999)

Total 179,635,763 (£ 18,399,648)

The total number of applications relating to mining in 1914 was 6,209, a decrease of 76 on the preceding year. Although the applications for prospecting and mining increased by 4 and 9 respectively, there was a falling off of 89 in the number of applications for alluvial mining owing to the decrease of applications for the mining of alluvial gold at Yame District in Fukuoka Prefecture and Ishikari in Hokkaido, so that the total number of applications relating to mining showed the decrease mentioned above. The number of mine-lots at the end of 1914 was 13,349, of which the lots for mine prospecting numbered 6,428 owing to an increase of the petroleum mine-lots and colliery lots and showed a record increase of 676 on the preceding year. The lots for mine-working numbered 5,324, being less than the figure for the preceding year by 64. But this was mainly due to the amalgamation of the lots; their total area has annually increased. The alluvial mine-lots numbered 1,597, including those for gold dust and iron sand, an increase of 46 on the preceding year. The volume of import trade of mine products during the same year was *yen* 57,712,621 (£5,911,361) and that of export trade *yen* 83,787,932 (£8,582,192), the total volume being *yen* 141,500,553 (£14,493,553), a decrease on the preceding year of *yen* 25,486,111 (£2,610,479). Although the export trade has been carried on since the beginning of the year in a comparatively favourable condition and showed an increase on the preceding year of about *yen* 100,000 (£10,243), notwithstanding that the trade has been greatly affected since August by the European war, yet the import trade decreased by about *yen* 25,500,000 (£2,611,902), chiefly owing to a falling off in the importation of metal, and thus the total volume showed a decrease as stated above. The amount of capital invested in mining enterprises by individuals can not be ascertained, but as regards the capital invested by companies, *yen* 20,310,850 (£2,080,390), of which *yen* 12,550,850 (£1,285,553) was paid up, was invested during 1914 through the establishment of new companies and the increase of capital of those already existing. Against this must be set the amount of reduction of capital due to the dissolution of companies so that the aggregate nominal capital of mining companies at the end of 1914 amounted to *yen* 251,441,400 (£25,754,522) being an increase on the preceding year of *yen* 18,760,850 (£1,921,628), of which *yen* 201,578,975 (£20,647,237) was paid up.

EXCESSIVE TAXATION IN NORTHWESTERN CHINA

In the January number of the FAR EASTERN REVIEW, under the heading of "Some Thoughts for China's Benefit," we drew attention to the lamentable condition of affairs produced in the Kweihwacheng-Suiyuan region by excessive taxation and brigandage. It is interesting to note that the Peking Government became so alive to the dangers with which the situation was pregnant that they sent a Special Commissioner to make an investigation and as a result of his report a Mandate was issued on February 22, which, if enforced, will be of great benefit throughout the country. The Mandate, as translated by the *Peking Gazette*, was as follows:

"Advices are not wanting in ancient teachings that national levies on the people must be in accordance with law. This is peculiarly true whilst a new empire is in the making. The finances of China, ever since the days of Hsin Hai, have been undermined by desperadoes at the very roots. Both the Government and the people have been financially embarrassed, whilst none of the obligations, such as foreign loans, military expenditure and administrative expenses, could be decreased. The Government has, therefore, been compelled to resort to the people. Under the circumstances the officials in charge of the collection of taxes should give heed to the virtuous intention (of the Emperor) and consider the case from both sides. Repeated orders and instructions have been given, advising and cautioning them, but neglect has grown with time, and certain corrupt officials have dared to oppress the people under the pretext of performing their official duties. The mere mention of such cases is enough to cause us bitter remorse. A report reached us sometime ago that the local officials of Kuei-Sui have been levying excessive taxes on the people, and orders were given to the Ministry to make confidential investigations through officials specially appointed. A report has now reached us that the regions named have been overburdened with excessive taxation in addition to corruptions of countless forms, among which the cart-tax and taxes on minor articles have been the cause of much complaint and grumbling. As the regions of Kuei-Sui are situated on the unproductive frontier, it is impossible to allow such corrupt officials, who do not care for the lot of the people, to extract money from them under skilfully created excuses. Another high official has been despatched to the spot, to deal with the matter; and the Ministry of Finance has been ordered to instruct the branch Bureau of Finance to consider the conditions of the local places and to abolish all the taxes which tend to harass the people in order to show our sympathy, and to avoid oppression. It is impossible to say that similar conditions do not exist in other provinces. The provincial high Authorities as well as the chiefs of the Bureaux of Finance are hereby ordered to instruct their subordinates to bear in mind the difficulties of the day and carefully measure the means of the people, whilst collecting the various taxes which must be in accordance with law and regulations. If any be found creating new levies for the purpose of extorting money, he will be punished without leniency upon discovery. Let this mandate be universally proclaimed."

ON CHINA'S INLAND WATERWAYS

Their Future Development as Part of an Organized Transportation System

[EXTRACTS FROM PRESIDENTIAL ADDRESS OF H. VON HEIDENSTAM, ROYAL SWEDISH CORPS OF ENGINEERS, BEFORE THE ENGINEERING SOCIETY OF CHINA]

In these days of keen competition between nations and individuals—in all parts of the world and on all fields of human activities—every nation, who wishes to live her own life in freedom and strength, is compelled to work with all her energy on a rational utilization and development of the material resources of the country as the only means to form the necessary economic basis for national existence and general progress and development. The Chinese people with a history, philosophy and character so different from the Western Nations, may not find this task to their liking, but necessity will soon be knocking at her door and the sooner the nation prepares herself for this work, the greater are the chances that she will succeed.

With her great wealth in agricultural land, in minerals and natural resources and possibilities, China possesses the most promising qualifications for a sound economic development. Modern competition and material culture have, however, reached such an advanced stage that organization, system and efficient scientific methods are required to achieve that end.

A recognized necessary factor in our Western scheme of material development is the care and furtherance of communications and transport facilities. Amongst the different means of transport in China, the inland waterways, rivers and canals can with safety be supposed always to show a larger amount of traffic, i.e., a larger aggregate number of ton miles, than any other. Thanks to nature and the energy of generations gone-by, the traffic on waterways early reached a high degree of development. So much so that even now, after centuries of neglect, in many districts the facilities offered by the waterways seem to be fully sufficient for the present demand. While admittedly the immediate needs of China lie on the general administrative and financial fields, commercial and industrial development has to go hand in hand with the administrative improvement and although the question of inland waterways as a whole can not be solved to-day or to-morrow, particular instances of waterway problems will soon present themselves and in order to avoid the usual mistakes of haphazard methods, an investigation with a view of

establishing a method and an authority for the handling of such problems appears profitable.

It may be interesting first to review the general question of waterways as compared with other means of transport, particularly railways. The historical order of development of lines of transport has been: rivers—roads—canals—railways. With the coming of the railway in the last century, the inland water communications suffered a serious set-back. The reason therefor was that the waterways in the early days enjoyed an absolute monopoly for transport of certain classes of goods, and like most monopolies, the water-transport monopoly was misused by the imposition of exorbitant freights and tolls. The advent of railways revolutionized the transport world, showed the canal freights to be exorbitant, compelled a general reduction in freight charges and this caused a temporary stagnation in waterway development the world over. In England, the new private railway companies were compelled, in many cases, to buy out the canals, so as to overcome opposition from vested interests, and a large percentage of English canals remain in the hands of the private railways; but on the European continent where rivers and canals are more naturally adapted for and predominate as means of transport, a resuscitation of inland navigation has lately taken place.

Even in topographically favourable country, without inclines and plenty of water available, the average cost of construction of a canal is quite equal to that of a railway carrying the same traffic, but the cost of maintenance and working, i.e., staff, stock, and traction is less on waterways than on railways. The wear and tear on the cargo-carrying stock is smaller and the life of plant longer. And generally speaking a unit of motive power can haul a greater weight on water than on rail if the most favourable conditions for water hauling have been obtained. In any fair comparison between rail or water, one must of course presume that in both cases the methods of handling traffic, loading, and unloading, and general organization are full developed and rational. It is not difficult to show that for intense slow traffic, transport on navigable rivers is cheaper than any railway transport, but in broken, undulating country, where a canal may possibly be constructed, but the traffic is not highly developed, the railway will prove more economical.

The last 255 years have seen not only the European but also the American continent very busy in setting its canals and rivers in order for inland navigation, generally by initiative and under management of the state. In the face of much opposition it has there been found that when constructed on truly economical lines, railways and waterways supplement each other and mutually increase each other's traffic and economic value.

It is well to keep in mind that from the point of view of national economy, the question of cheap transport is a vital one, because all expenditure on transport is of necessity an unproductive one, as it neither improves nor creates new values or products, and the bringing down of the transport cost to a minimum thus means advantage both to producer and consumer.

On account of the varied objects served by waterways, the handling of the waterway-problem on pure business principles—i.e. with a view to returns on capital—is by no means possible and a qualified opinion on the point, whether the advantages accruing from a waterway are worth the expenditure, is often difficult to form. But as I am here limiting myself exclusively to the transport side of the general problem of waterways I think I am right in saying that a waterway for cheap transport of goods (or such part or percentage thereof as may be considered performing transport duty) should be always judged also from the business-point of view, with all allowances made for the peculiarities of each case. For instance in cases where waterways are free from tolls it may throw an interesting light on the value of such a waterway, if a calculation were made to show, what tolls would have to be collected per ton (or ton mile) in order to make the canal a self-supporting concern.

Further, it should be understood that it is in regard to the mode of working where the improvement and development of waterways has to be found nowadays, which ought to be specially remembered when the question is applied to China. The first and most important step of improvement on natural

waterways is to ensure the safety and continuity of navigation by establishment of navigational aids, by signals and buoys, by removing of obstacles, by control and supervision. The next step would be to rationalize the handling of cargo, the general organization and management and the size of vessels and mode of traction, and first after or simultaneously with those reforms, the problems of regulation of rivers and large canal-works can be successfully tackled.

Reverting to the conditions in China, the present state of her navigable inland waterways is all but creditable to her. Chaos and neglect are supreme everywhere. The only light spots in the picture are the places where the Maritime Customs have succeeded in reforming and improving things. I hold, however, that the time is soon approaching when the problems of inland navigation as part of the great problem of cheap transport should be given full attention in this country and the reasons which speak therefor, I shall now briefly put before you:

The railway system will soon be comparatively well developed and by the completion of the lines now under construction, the Hankow-Canton, the Hankow-Szechuen, the Nanking-Changsha, the Pukow-Singyang and certain other proposed lines, the Government will, as far as trunklines go, have accomplished the majority of the main commercial, strategical and political lines, which in any case would be required in order to bind together, politically and strategically, this vast empire.

Considering that in the rational development of the communications of any country, a stage will soon be reached when a proposed further railway development should always be compared with possible waterway development and *vice versa*, it is clear that the sooner the data for such comparisons are collected and made available, the better it is for the harmonious development of transport facilities.

Due to the great war, foreign capital, whereupon so far railway development has been largely dependent, is during the next decades not likely to be available for railway loans to the same extent as before, and China may now be more left to her own resources.

The capital spent on labour, construction and materials and even floating plant for improvement of rivers and canals remains all, with very few exceptions, in the country, while in the case of railways the money spent outside China on foreign imports of bridges, rails, sleepers, locomotives and rolling stock is considerable.

In very many cases the improvement of an existing waterway can be done gradually with small yearly capital outlay, so as to give direct and immediate advantages to both through and local traffic. The large capital expenditure during 5 or 10 years required to complete a longer railway for through traffic is not essential. In the case of China this is an important point in favour of waterway development.

The mere existence of an excellent nucleus of waterways and possibilities of development speak for their rational utilization. Compared with other countries the cost of construction and amortization and interest on capital required for present improvement of waterways will be small, counted per unit of length.

Generally speaking, for construction and improvement of canals, there exists no more favourable ground than the great plain of China, stretching from the Gulf of Pei Chi Li to the Chien Tang River. Further China has her widely spread, large, navigable river systems, which are often cheaper to improve than to build canals, and here lays one of her greatest assets on the transportation field.

The whole history of China is bound up with her rivers and waterways and a continuation of her waterways development would come natural to her and her people and need comparatively little foreign assistance both in construction work and traffic.

This assistance technically, if I leave out the delicate question of administration altogether, need only take the form of investigating and controlling engineers. The Chinese, who with due training and under proper directions, soon serve their apprenticeship, will undoubtedly be able to cope with the work and show their natural ability therefor.

The small costs of establishing loading and unloading facilities along a waterway make its banks at any point a fine site for all kinds of industries and factories. The existence of an efficient waterway-transport service thus stands for decentralization of industrial and factory districts and has a great importance for the social conditions of the country, by avoiding the overcrowded unhealthy conditions of large manufacturing centres. Further the agricultural interests along a waterway derive great benefits from the ease whereby *at any point* certain cheap goods such as stone, sand, timber, agricultural products, etc., can be shipped. In China, the whole industrial development is still in its infancy but it will, as in every country, greatly depend on whether the large producing districts are able to send their products to the consuming centres (for refining industries, re-distribution, export, etc.) at comparatively small cost or not; with other words, on cheap transport for raw products.

The mere enumeration of some of the problems confronting China in the future development of her waterway problem shows how large the task is. The data available, both in topographical, technical, economical, traffic-statistical and other respects, are so scant that reliable conclusions are impossible to arrive at at the present time.

But one thing is certain: If the present policy of all rail and no water development is continued indefinitely, this country may run the risk of not having its primary natural means of transportation properly utilized and other means

developed at their expense, which would ultimately mean an indirect but large national loss.

The remarks above made only view the inland waterway problem from the point of view of transport chiefly of raw or refined products for agricultural and industrial interests. Naturally in dealing with the rivers of China there are other and even more important issues involved, such as flood-prevention, drainage irrigation, waterpower, timber floating, etc. etc. Further, part of the traffic on several of China's inland waterways comes under the heading of ocean navigation, which in these cases of course puts another colour on the problem.

Thus it is clear that the general problem of waterways and all that it involves in different fields and activities, has to be approached with a very open mind and on the basis of most careful preliminary studies on many different fields, one of the most important of which undoubtedly is that of transportation.

The relative importance and economic value, as compared with other means of transport, and general character of the inland waterways varies considerably in different countries and the results from one cannot be applied to another.

The first step to ensure the right development of the transport problem in China would therefore be an investigation of the conditions of the waterways—carried on for a certain length of time on broad and comprehensive lines—and collection of the data required to form an opinion on the main inland navigation improvement scheme and possibilities, as a preliminary to the formulation and enactment of a definite government policy in waterway matters.

JAPAN'S BUDGET FOR 1915-16

The General Budget for the Financial Year 1915-16, following in the wake of that for 1914-15 which had failed to pass, was framed with the object of completing the administrative and financial adjustment which had been commenced in the year 1913-14 and of carrying out various urgent plans; but unfortunately, an official report explains, the provisions in it for an increase of two army divisions in Chosen aroused the opposition of the House of Representatives, with the result that the House was dissolved at the end of December, 1914, and the General Budget and the various special account Budgets were rendered ineffective and the Government had to fall back upon the Budget for the preceding year according to the provisions of Art. LXXI of the Constitution.

In the General Budget for 1914-15 which had to be followed in the succeeding year according to the Constitution, the total revenue was put at *yen* 672,195,010 (£68,851,275) and the total expenditure at *yen* 651,139,899 (£66,694,653); but these figures being merely formal standards, the Government, following precedent in the same manner as in the preceding year, framed a sort of self-denying working Budget within the limits of the formal Budget.

Upon adding the amounts given in the working Budget which was framed as above stated and the amounts given in the Supplementary Budget which was passed at the special session (the thirty-sixth session) when the Diet was convened in May, 1915, that is to say practically, according to the Budget to be carried out in 1915-16, the revenue is put in the ordinary section at *yen* 524,348,823 (£53,707,755) and in the extraordinary section at *yen* 96,641,441 (£9,898,744) (the sum to be brought over from the preceding year being put upon comparison with a similar sum brought over in 1914-15 at *yen* 47,948,882 (£4,911,286) according to calculation made in June, 1915, making a total of *yen* 620,990,264 (£63,606,500); and the expenditure stands in the ordinary section at *yen* 402,742,689 (£41,251,940) and in the extraordinary section at *yen* 187,559,241 (£19,211,230), making a total of *yen* 590,301,930 (£60,463,170), and thus leaving a surplus of *yen* 30,688,334 (£3,143,330). In the ordinary sections of revenue and expenditure there is a surplus of *yen* 121,606,134 (£12,455,816).

The following table gives a comparison of the revenues and expenditures of the working budgets of the two years 1914-15

and 1915-16. (By the term Budget in the remaining portion of the present article to be understood the working budget of either of the two years above referred to).

	1915-16	1914-15	Decrease
Revenue	<i>yen</i>	<i>yen</i>	<i>yen</i>
Ordinary	524,348,823	534,182,862	9,834,039
Extraordinary ..	96,641,441	120,132,239	23,490,798
Total.. ..	620,990,264	654,315,101	33,324,837
Expenditure			
Ordinary	402,742,689	415,971,859	13,229,170
Extraordinary ..	187,559,241	207,880,569	20,321,328
Total.. ..	590,301,930	623,852,428	33,550,498

Upon comparing the revenue for 1915-16 with the estimate for the preceding year, we find that in the ordinary section there is an increase of *yen* 6,270,000 (£642,221) in taxes and duties, owing mainly to an increase of *yen* 3,960,000 (£405,613) in income tax and *yen* 1,380,000 (£141,350) in sugar excise. Moreover, by the increase of receipts on account of war and curtailment of expenditure in consequence of administrative adjustment, the profits of the various Government works and factories increased by *yen* 1,150,000 (£117,792); there was an increase of *yen* 9,770,000 (£1,000,717) in the transfer of the Monopoly Bureau profit by recovery of the amount of decrease temporarily caused in the preceding year through a revision of the financial year relative to the postponement of payment of prices for monopoly goods; and there was also an increase of *yen* 6,850,000 (£701,629) through an increase of goods sold and delivered; thus, the receipts from Government enterprise and State property increased by *yen* 18,160,000 (£1,860,084). There was also an increase of *yen* 2,590,000 (£265,287) in the transfers from the special accounts for the Governments-General of Chosen and Taiwan; thus, the total increase came up to *yen* 27,040,000 (£2,769,640). But, on the other hand, in consequence of the adjustment of the tax system which had been decided upon in the preceding financial year, the reduction of tax rates caused a decrease of *yen* 1,930,000 (£197,685) in land tax, *yen* 7,450,000

(£763,085) in business tax, *yen* 1,250,000 (£128,034) in succession tax, and *yen* 30,000 (£3,073) in bourse tax, making a total decrease of *yen* 10,670,000 (£1,092,902). Moreover, taxes and duties of all kinds were seriously affected by the great war in Europe; thus there was, among others, a decrease of *yen* 17,870,000 (£1,830,380) in Customs duties, *yen* 5,630,000 (£576,667) in textiles consumption tax, and *yen* 1,350,000 (£138,277) in bourse tax, making a total decrease of *yen* 25,830,000 (£2,645,703); and decreases in the stamp receipts, miscellaneous receipts, and transfers from deposits special account brought up this total to *yen* 36,870,000 (£3,776,503), making the net decrease in the ordinary section *yen* 9,830,000 (£1,006,863).

Upon comparing the expenditure for 1915-16 with the estimates for the preceding year, we find that in the ordinary section, with the progress of the already-fixed programme, there was an increase of *yen* 2,990,000 (£306,258) in the new warships expenditure, annuities and pensions increased by *yen* 2,670,000 (£273,482), and the second reserve fund by *yen* 2,000,000 (£204,855), and these with the sum to be transferred to the Government-General of Taiwan and expenses required for the stationing of two army divisions in Chosen brought up the total increase to *yen* 11,410,000 (£1,168,698). On the other hand, the transfer to the sinking fund decreased by *yen* 19,200,000 (£1,966,609) on account of the decrease of the amount to be devoted to the redemption of the national debt in consequence of the revision of the Law concerning the Sinking Fund Special Account; there was also a decrease of *yen* 3,280,000 (£335,962) in consequence of administrative adjustment; and these, together with reductions in provisions expenditures under the army military expenses section and various repayments, brought the total decrease to *yen* 24,640,000 (£2,523,814), which made the net decrease of the ordinary section *yen* 13,220,000 (£1,354,092). In the extraordinary section, there was an increase of *yen* 20,000,000 (£2,048,551) in the loans to the Imperial Railways special account and of *yen* 8,630,000 (£883,950) in the loans to the Chosen undertakings fund; the warships construction expenses increased by *yen* 11,830,000 (£1,211,718), and these, with the war reserve for 1914, increased amount of transfers to the waterways improvement fund special account, increase of the Monopoly Bureau permanent working expenses fund, Chosen divisions construction and equipment expenses, and additional expenses for the extension of the Steel Foundry, made the total increase *yen* 59,540,000 (£6,098,535); but on the other hand, there was a decrease of *yen* 20,820,000 (£2,132,541) in the continuing expenditures on account of the reduction of the already-fixed annual amounts and postponement of undertakings in consequence of administrative adjustment; the administrative adjustment also reduced miscellaneous expenditures by *yen* 7,690,000 (£787,668); transfers to the military expenses special account were reduced by *yen* 34,680,000 (£3,552,187); and these, with reductions in transfers to the Chosen Government-General special account, and loans for the repair of damage done by natural calamities and relief of localities suffering from poor crops, made the total decrease *yen* 79,860,000 (£8,179,863), giving the net decrease in the extraordinary section as *yen* 20,320,000 (£2,081,327), which made the decrease of the total expenditure *yen* 33,550,000 (£3,436,444).

Such is the general account of the revenue and expenditure estimates to be carried out in the Financial Year 1915-16. It had been intended in the Budget for the year to carry into effect the financial programme which had been announced when the present Cabinet was formed and to meet the urgent demands of the State; but unfortunately, in the situation created by the great war, not only was the defrayment of enormous sums required to meet the military expenses and other expenses connected with the war, but the same situation caused a great reduction in the revenue, with the result that there were no means of improving the relations between the receipts and disbursements of the National Treasury and forming new plans for the reduction of taxes and duties with resources created by the surplus in the National Treasury as had been at first intended; and further, in regard to other expenditures, plans could not be carried into effect on account of the dissolution of the House of Representatives. It was a cause of deep regret to the Government; but in regard to the most urgent of these measures, a Supplementary Budget was passed in the thirty-sixth

session of the Diet and thus the Government was enabled to carry them into effect. The following were the most important among the measures so passed:—

With respect to the national defence expenditure which had for many years been the subject of heated political discussion, the expenses for the purpose were calculated according to the programme of military and naval preparations which had been decided upon after investigation by the National Defence Council. Thus, the warships construction expenditure is to include the expenses required for completing the three battleships, the construction of which had been commenced in 1913 and the expenses required for building eight torpedo-destroyers and two submarines; the amount is *yen* 90,350,000 (£9,254,328), in addition to the already-fixed continuing expenditures; the total sum is to be spread over four financial years from 1915-16 to 1918-19, when they are expected to be completed, and the additional amount required in 1915-16 was *yen* 22,130,000 (£2,266,721); but as of the amounts already fixed, *yen* 10,300,000 (£1,055,004) was available as it had not been put to use, the actual amount required additionally in that year was *yen* 11,830,000 (£1,211,718). Further, as regards the expenditure required for the permanent stationing of two army divisions in Chosen, in addition to *yen* 240,000 (£24,583) for ordinary military expenses, the expenses for structures and equipment were fixed at *yen* 11,980,000 (£1,227,082), to be spread over seven financial years from 1915-16 to 1921-22, the amount required in the first named year being *yen* 470,000 (£48,141).

For expenditures for the extension of the Steel Foundry there was added to the already-fixed amount the sum of *yen* 3,180,000 (£335,720) as expenses required for the establishment of a workshop for the production of thick plates; it is to be completed in three years from 1915-16 to 1917-18, the additional amount to be disbursed in the first named year being *yen* 112,500 (£11,523). To the already-fixed expenditures for 1915-16 the sum of *yen* 570,800 (£58,466) as expenses for equipment for the manufacture of benzol and toluol was added.

As regards the national debt, although the Government had hitherto followed the policy of not resorting to public or temporary loans for sources of revenue of the general account, it had resorted to them for expenditures for the construction and improvement of State railways, undertakings in Chosen, and waterways improvement fund; but in the Budget for 1915-16 these expenditures were to be defrayed from money obtained by the reduction of the amount to be devoted to the redemption of the national debt, surplus of the Nationals Treasury, and other general revenue, and in this manner it is intended to strengthen the Financial basis and maintain its credit. At the same time the Government amended the provision in the Law concerning the Sinking Fund Account that the amount of annual transfer from the general account for the redemption of the national loans raised for the payment of the expenditures connected with the war with Russia must not be less than *yen* 110,000,000 (£11,267,029), and decided that from the Financial Year 1915-16 the amount to be annually redeemed must not be less than 1/16 of the total amount of the national debt at the beginning of the preceding financial year, and the amount of redemption every year must not fall below *yen* 30,000,000 (£3,072,826). Thus, the amount of the national debt to be redeemed was put in the Budget for 1915-16 at *yen* 30,000,000 (£3,073,826), a decrease of *yen* 20,000,000 (£2,048,551) on the annual amount up to that time. Further, the largest amount of Treasury Bills afloat in 1915-16 was *yen* 50,000,000 (£5,121,377) as in the preceding year.

In fine, as regards the working Budget for 1915-16, the war caused a very great decrease of revenue to the National Treasury and, moreover, not only were the various laws relative to the reduction of taxes which had been established and promulgated in the preceding year brought into force, but as the various expenditures connected with the war were considered important, several urgent and indispensable measures were carried out by drastic curtailment of expenses in both the general and special accounts and postponement of many undertakings. Especially, the solution of the question of the increase of army divisions and construction of warships which had long agitated the political world of Japan, will, it is believed, have a very beneficial effect upon political administration in the future.



TYPICAL VIEW OF HARDWOOD FOREST



PHILIPPINE FOREST TREES—ISLAND OF NEGROS

PHILIPPINE WOODS IN THE CHINA MARKET

[By E. E. SCHNEIDER, WOOD EXPERT, PHILIPPINE BUREAU OF FORESTRY]

Even before the Spanish conquest of the Philippines, there was some traffic in wood between the islands and China but this was probably limited to very small quantities of some of the most valuable cabinet woods, such as Ebony and Camagon, Narra or Tindalo, and perhaps also some of the very strong and durable woods used in ship building. During the long Spanish regime this traffic increased considerably, especially as regards the latter class of woods. Among the species oftenest mentioned as being exported to China were Aranga, Ipil, Molave, Dungon and Yakal. These exports ceased almost entirely at the outbreak, in 1895, of the revolution against the Spanish power and it was only some years after the establishment of the American government in the islands that they began again.

At first, the exports of wood to China were of the same character as during the latter part of the past century, that is, they consisted mainly of those shipbuilding timbers known since ancient times for their strength and durability, with a smaller proportion of cabinet woods. But meanwhile, two great changes had taken place. Even before the revolution, most of the very high grade construction timbers had been becoming scarcer and higher priced. After peace was established under the present government, the local demand for these woods naturally increased, not only to repair the damages caused by neglect and active

destruction during the war, but also for many new undertakings. On the other hand, there began about ten years ago the exploitation on a large scale of the great dipterocarp forests, with the result that there has become available a supply of the very abundant woods of the Apitong and Lauan groups greater than was ever before found in the markets. Practically the only wood whose status has not changed much is Yakal. This, as well as the other high grade construction timbers, had been growing scarcer, but the opening of new forests, while contributing very little to the supply of Molave, Ipil or Dungon, did increase very much the supply of Yakal, so that the latter is now available in as great quantities and perhaps even greater, than during the latter years of the past century.

The result of these changes is that the supply of the very high grade woods except Yakal will always be limited, while there will be available for export great quantities of the Apitongs and Lauans, of Yakal, and of a few other woods, Pagatpat and Lumbayau being the most notable among those that do not belong to the Dipterocarp or Lauan family.

A comparison between these Philippine export timbers and the other foreign woods now used in China is perhaps best introduced by showing the mechanical properties of Philippine woods and those of some of the best known American and



PINECLAD MOUNTAINS OF ISLAND OF LUZON



MANGROVE SWAMP SHOWING LARGER TREES OF PAGATPAT

Bornean timbers. The following figures are taken from "Mechanical tests, Properties, and Uses of Thirty-four Philippine Woods" by Rolland Gardner, Bull. No. 4, Bureau of Forestry, Manila, 1907.

Name of Wood.	Country of Origin.	Avg. modulus of rupture (lbs. per sq. inch)	Avg. modulus of elasticity (1000 lbs. per sq. inch)	Average specific gravity of dry wood.
Oregon Pine	U.S.	7900	1680	0.510
Longleaf Pine	U.S.	10900	1890	0.610
Cal. Redwood	" "	9110	1320	0.445
Borneo Yakal	Borneo	12395	2027	0.755
Kruen (Borneo Apitong)	"	8700	1604	0.653
Seraiah mira (Red Lauan)	"	7450	1299	0.614
Seraiah Puteh (White Lauan)	"	9390	1554	0.547
Yakal	Phil. Is.	15690	2583	0.843
Guijo	" "	15150	2158	0.708
Apitong	" "	11620	2144	0.645
White Lauan	" "	9760	1653	0.446
Red Lauan *	" "	7100	1201	0.406

Yakal is hard, heavy, tough, difficult to split, and very durable; even termites ("white ants") attack it only very slowly; the only destructive agency it does not resist well is the teredo. It is yellowish to light grayish brown, turning to dark brown on exposure, of fine texture and with crossed grain.

Yakal is one of the most valuable timbers in the Philippines for high grade construction, being especially useful for long beams in ship, wharf and bridge building and mill, factory and house construction on account of its great strength and stiffness. It is also used in greater quantities than any other one wood for railroad ties. It is specially recommended for skating rink and ball room floors, where a dense and fine wood is required, and floors subject to very rough usage, such as wharf, bridge and factory floors.

Prices: Yakal has been quoted by various companies during 1915 at the following prices; it must be understood that these are for ordinary dimensions and current grades: F.O.B. at mills (Mindanao) \$30.00 to \$45.00, U.S. Cur. F.O.B. Manila, \$45.00 to \$50.00. Railroad ties sell in Manila at from \$0.75 to \$0.875 each, as compared with Japanese oak ties in China (Hankow) at \$0.675. All these prices seem high as compared with those of American and Japanese woods, but it must be remembered that in strength and durability Yakal is equal or superior to the best American and European oaks.

Guijo. Guijo is only slightly lighter, softer, and less strong than Yakal, but much less durable when exposed to weather or in contact with the ground; it is of fine texture, somewhat cross grained and ashy gray or dull reddish brown in color. For all interior structural parts, or where thoroughly protected by painting, it ranks high among Philippine construction timbers. It is also much used in ship building and especially for keels, ribs, gunnels, etc., of large lighters and sampans. Being tough and difficult to split, but lighter and cheaper than Yakal, it is much used for wagon and cart-beds, axles, shafts, felloes, spokes, bolsters, reaches, etc.; more Guijo is used for heavy vehicles than any other one wood.

Prices.—F.O.B. at mills (Mindanao), \$27.50 to \$35.00 per M.; F.O.B. Manila, \$35.00 to \$55.00 per M.

Apitong.—Apitong in mechanical properties is similar to Guijo, but is of somewhat coarser texture and less tough; its color ranges from light red to dark brown, the greater bulk of the lumber in the market being of a fairly uniform light reddish brown. Apitong is practically identical with the Kruen of

Borneo or Krewing of the Federated Malay States. Like Guijo, Apitong is not durable when in contact with the ground or otherwise exposed to very severe conditions. Though somewhat resinous, it is easier to work than Yakal and Guijo.

Apitong is used in Manila in greater quantities than any other one wood in ordinary construction, for posts above stumps, beams, joists, rafters, studding, flooring, etc.; it is also used for sheathing and ceiling, but for this purpose Lauan is employed more than Apitong. It makes a hard, durable and handsome floor when finished with wax.

For railroad ties Apitong is not recommended for tropical climates or where termites are abundant and destructive, but in cold, dry regions it may be expected to give fair service. Several shipments of Apitong have been made to India for railroad ties and for railroad car construction, but no reports are yet available as to the service it has given.

Prices. F.O.B. at mills, \$20.00 to \$25.00; F.O.B. Manila, \$30.00 to \$35.00.

The LAUANS. Under this general name are classed together all the light, soft woods of this family known in the Malayan region as "Seraiah" and "Meranti." They range from pale yellowish, reddish or brownish white to dark reddish brown. In regions where any one well-known species is abundant, this will be sold separately and under its own name. Where a number of species are found in very mixed forests, they are felled and sawn indiscriminately and roughly sorted in the yard into red and white, all the bright red to dark red lumber going into the red pile and all those having only a reddish or light brownish tinge into the white.

All the Lauans are comparatively soft and light, and very easy to work. They are almost always distinctly cross-grained, so that, when quarter sawn, they show a conspicuous and often very regular ribbon grain like that of the mahoganies. They all take stains very well, so that the lighter colored ones especially can be stained to any desired shade of gray, yellow, red or brown. They shrink considerably in seasoning, but are not specially liable to warping and, when once seasoned, they work very little.

The Lauans are used in the Philippines for all purposes from the most ordinary rough work to interior finish and highly finished furniture. The only uses from which they are excluded are those requiring either great strength or unusual durability. Red Lauan and Tangile are commonly finished either natural or with stains and fillers that heighten their natural reddish color; Almon, Kalunti and White Lauan are more rarely finished in natural colors. In cheap furniture and clothes chests they are often finished with a yellowish brown varnish similar to that used on Teak furniture in Hongkong, but more commonly a deep, brilliant red varnish is used. In practically all medium grade and cheap houses in Manila both siding and interior sheathing, partitions and ceilings are made of Lauan. This sort of work is almost invariably painted. The Lauans take and hold oil paint very well and have one advantage in appearance over the pines in that they rarely have knots and pitch seams from which the pitch will come through the paint. Not only are knots rare, but such a thing as a loose knot, that can drop out of a board, is almost unknown. Rotten knots, of course, may occur, but sound knots have their fibers so interlaced with those of the surrounding wood that they scarcely constitute an element of weakness.

The following are the best known and most abundant species of the Lauan group.

ALMON. Pale reddish, but fading out on exposure to air to light yellow. Few mills separate it from the other light colored Lauans. Where kept separate, sells at about \$22.50 F.O.B. at mill or \$30.00 F.O.B. Manila.

In mechanical properties and color Almon is very close to White Lauan. When stained, they are practically indistinguishable.

BAGTIKAN. Slightly harder and heavier than average Almon and White Lauan. Wood from young trees light colored, but in large trees of a pale, but distinct brown tint. Rarely sold separately under its own name, being generally mixed either with Almon or with White Lauan; some of the darkest boards are

* The tests of Red Lauan were made only on beams with a very high average moisture content (65 to 84 per cent); for seasoned lumber, the figures would be considerably higher, probably approaching those for White Lauan.



SHEA LOGGING ENGINE STARTING FOR THE FOREST



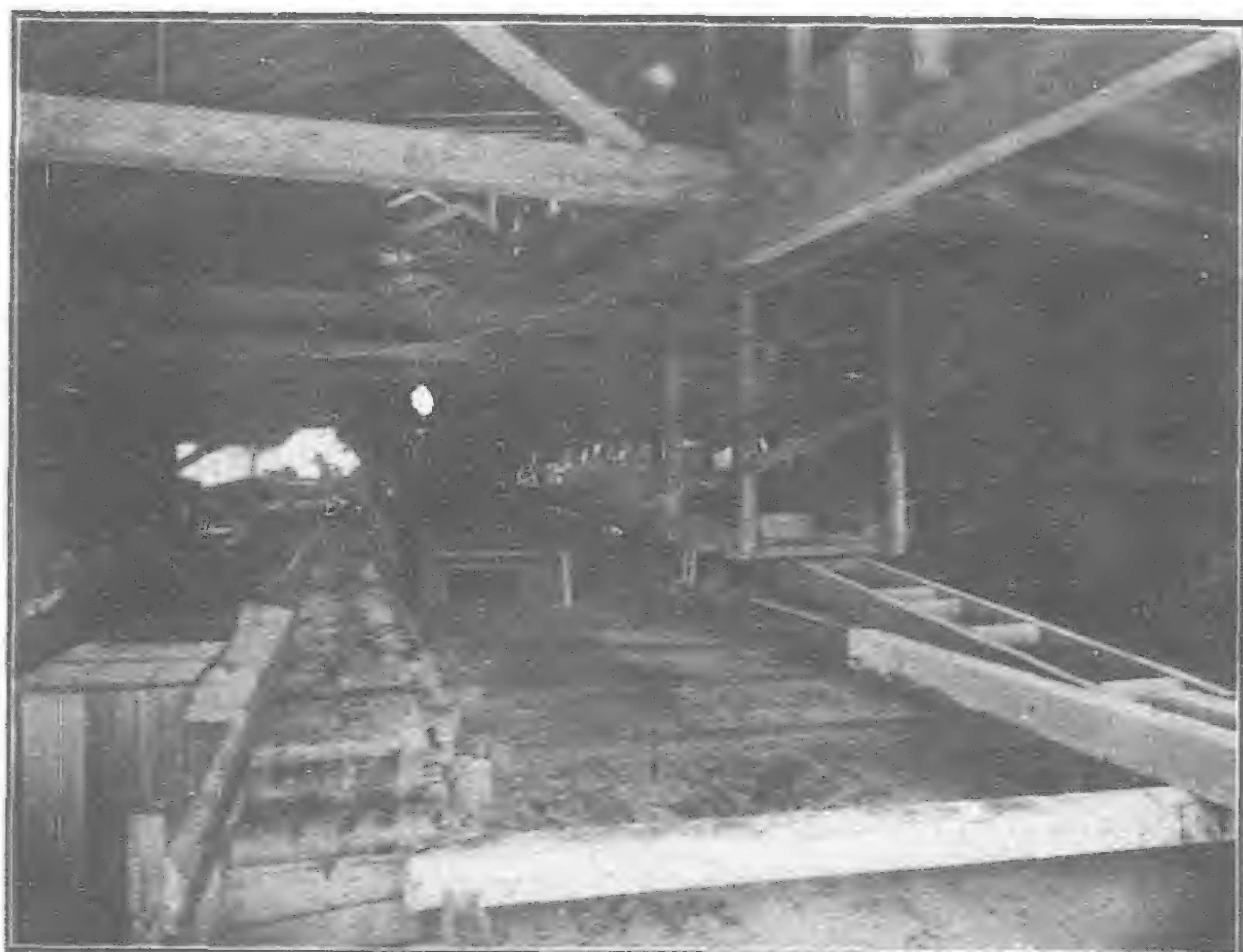
LOGS FLOATED DOWN RIVER ABOUT TO ENTER MILL



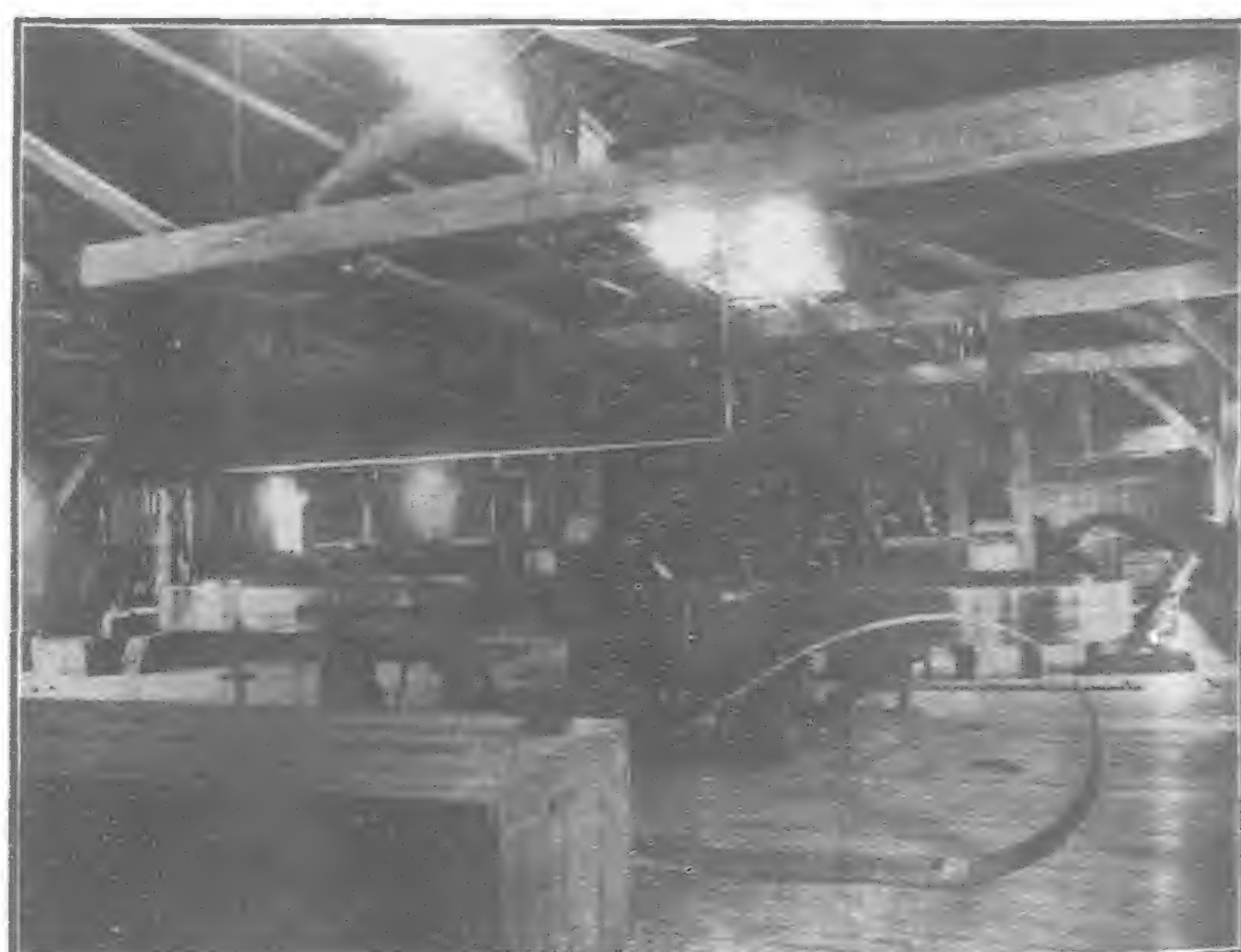
HAULING LOGS FROM RIVER INTO MILL



LUMBER SHEDS WITH EXPORT STOCK PILED FOR SEASONING



SECOND FLOOR OF MILL SHOWING TRIMMING SAWS



SAW FILING ROOM OF INSULAR LUMBER CO.'S MILL

occasionally found in lots of Red Lauan. Unless intended for natural finish where even color is desired, Bagtikan is not different enough in mechanical properties to be separated from the other Lauans.

RED LAUAN. This is the most brilliantly colored wood of the family. It ranges from bright pale red to dark reddish brown, but the great bulk of the lumber on the market is of a very uniform red color about as dark as average cigar box cedar. Owing partly to its very regularly cross-grained structure and partly to its color, the ribbon grain in Red Lauan is also more conspicuous than in most of the other Lauans. It is for this reason as well as on account of its great abundance, that Red Lauan has been exported to the United States more than any other wood under the trade name of "Philippine Mahogany," though of course it is not a mahogany at all. For the same reason it has been more used in Manila for interior trim and highly finished furniture than all other cheap and medium priced woods put together. Finished with a transparent varnish, the natural reddish color changes

to a rich reddish golden brown somewhat similar to that of a dark golden oak finish. A dark brown filler used before varnishing increases this effect.

If a mahogany red finish is desired, a light red filler and a very slight stain will give it a permanent rich red color as brilliant as that of cherry or mahogany.

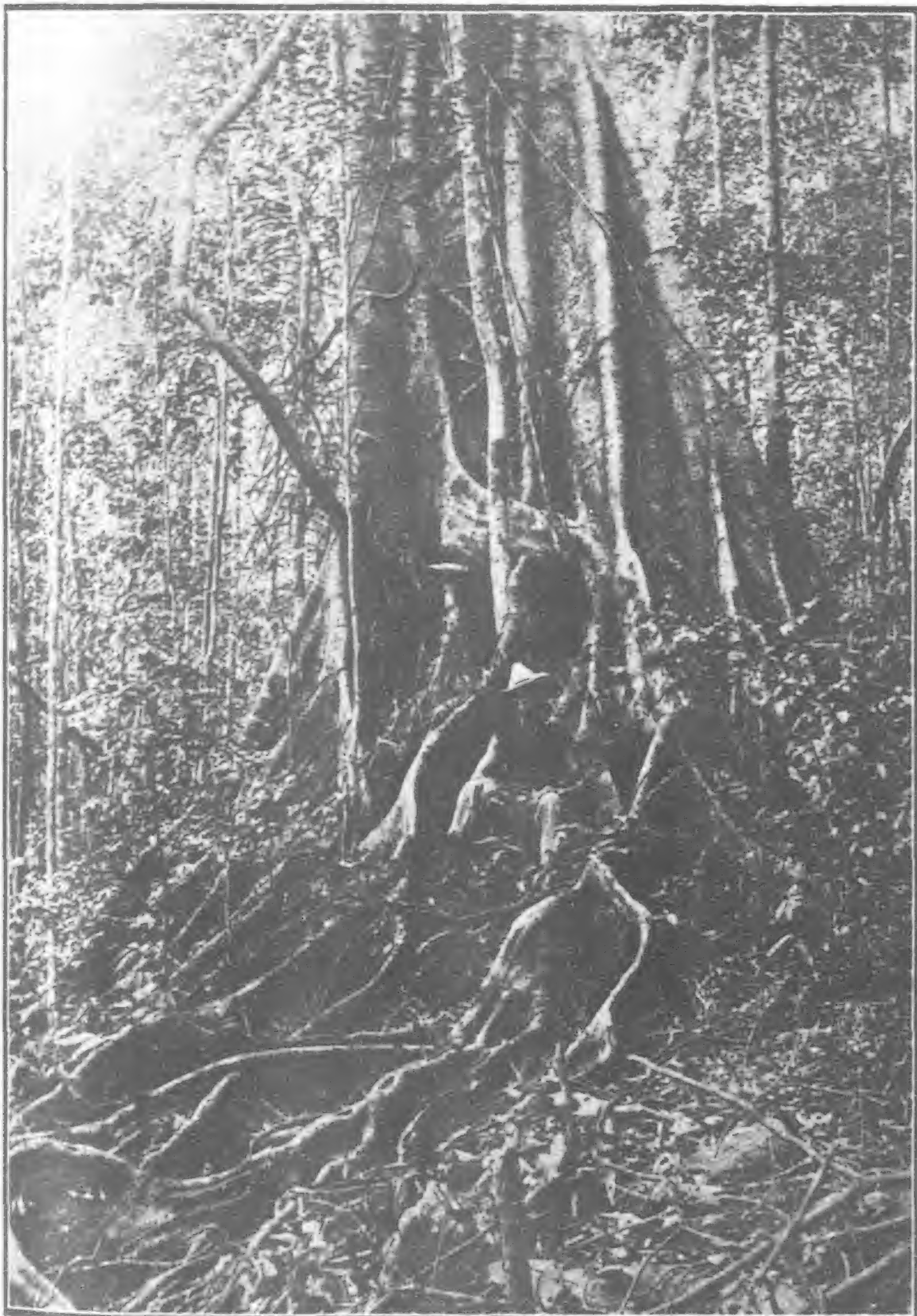
Prices. F.O.B. at mills, \$22.50 to \$25.00; F.O.B. Manila, \$25.00 to \$40.00.

TANGILE. This is the heaviest, hardest and finest-grained of all the Lauans. It is rather variable in color; in some regions it is of the bright, glossy red found in the wood of young trees of Red Lauan, while in others it is much darker, but the darker varieties are rather golden than reddish brown. Like Red Lauan, Tangile has a conspicuous ribbon grain. Being denser than the other Lauans, Tangile can be filled and polished with less expense of labor and materials. Also on account of its slightly greater hardness

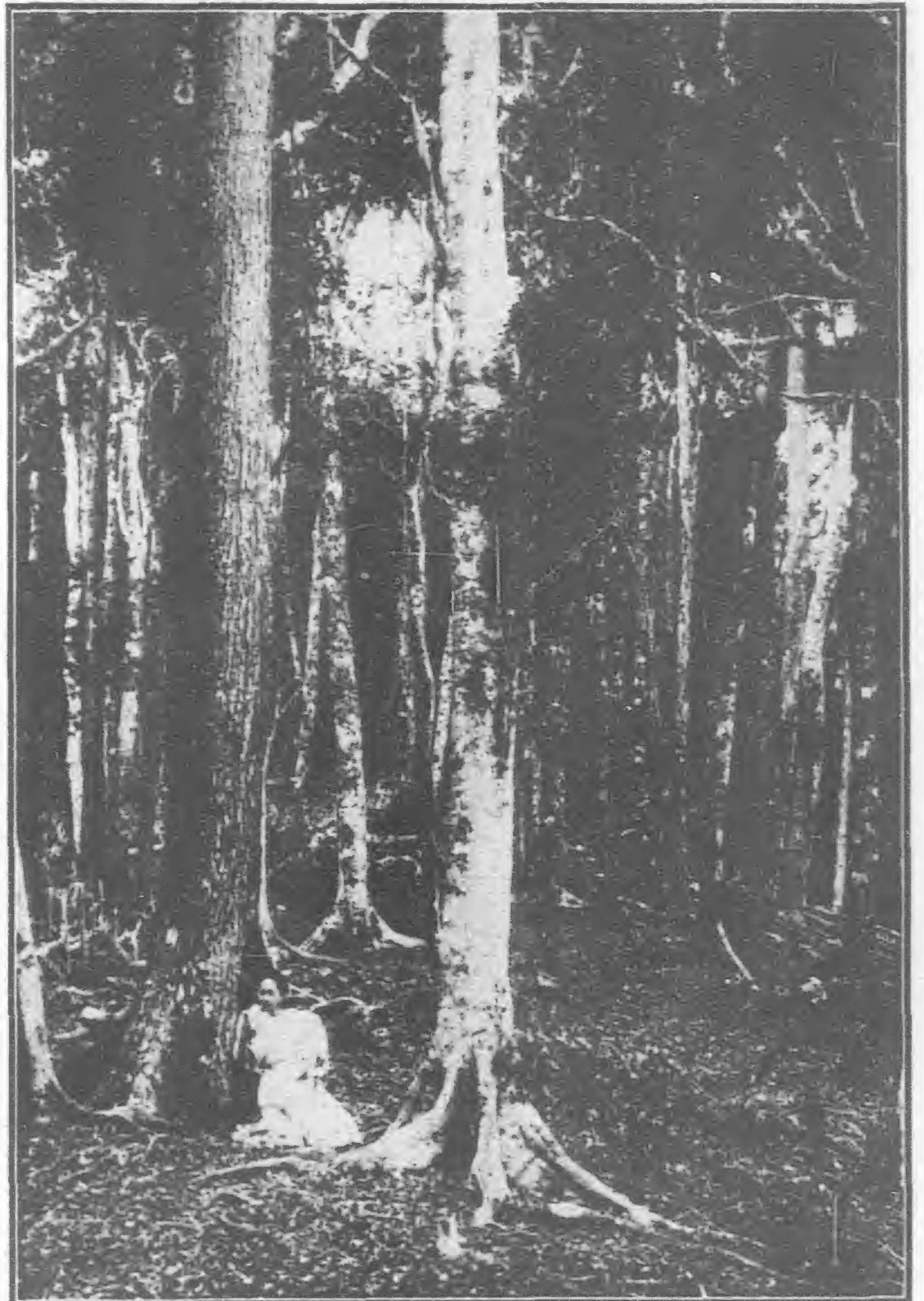
and density, it resists nicking or denting better, which is an advantage for furniture and parts of interior finish subject to occasional knocks.



INSULAR LUMBER CO.'S MILL—SORTING AND DISTRIBUTING TRACKS



PHILIPPINE FOREST GIANT SHOWING BUTTRESSED BASE



FOREST WITH UNDERGROWTH CUT AWAY

Prices. F.O.B. Manila, \$30.00 to \$35.00 per M.

WHITE LAUAN. Light, soft, but difficult to split and fairly flexible and tough; grayish white with sometimes a light brownish tinge, under transparent varnish taking a distinct yellowish tint.

White Lauan is one of the most abundant woods in the Philippines and in most regions where abundant it is cut and sold alone and under its own name. However, there are a number of less abundant species which in the rough board are practically indistinguishable from it and so are frequently found mixed in lots of White Lauan. Almon, light grades of Bagtikan, and Kalunti (a very white species found in Mindanao) are the ones most commonly confused with it.

White Lauan is used more extensively in Manila than any other one wood for all purposes where cheapness and ease of

working are of more importance than strength and great durability. Many contractors and builders prefer it to Oregon Pine for concrete forms on account of its toughness and difficulty of splitting. While Oregon Pine can generally be used only once or twice for this purpose, White Lauan will stand using three or four times.

On account of its very light color, it can be stained to any shade desired of gray or yellow to deep reds and browns.

Though somewhat heavier than the lighter pines, it makes excellent packing cases, which will stand much rougher usage than the average pine box.

Prices. F.O.B. at mills, \$17.00 to \$25.00; F.O.B., Manila, \$20.00 to \$30.00.

Beside the above, which are all woods of the Dipterocarp or Lauan family, two others, one little and the other not at all known until the recent development of the lumber business in Mindanao, have come into the markets and promise to furnish a steady supply for a good many years to come:

LUMBAYAO. A wood very similar to Red Lauan in general appearance. It has a richer red color and a more striking figure. It is a little harder and heavier and considerably tougher than Red Lauan and also seems to be somewhat more resistant to decay and insect attacks. Its chief use in Manila is

for flooring, sheathing and ceiling, doors and windows, and general inside finish. A considerable amount of small dimension stuff is also used for joists, studding and rafters. The street car company has used it for interior finish in electric cars, for which it is a very pretty and durable material. It is also an excellent wood for boats and launches, for ships' interiors, deck cabins, etc. In Zamboanga and Basilan, where it is chiefly produced, it is a favorite for boxes, being tougher and more difficult to split, but very little heavier than the Lauans. Among the various kinds of flooring laid in the Philippine Forestry Exhibit at San Francisco, Lumbayao, on account of its lively color and conspicuous grain, attracted more attention than any other wood.

Prices. F.O.B. at mills, \$24.00 to \$30.00.

PAGATPAT. This is a hard, heavy wood of very even and straight grain and fine texture, grayish brown to dark chocolate brown in color. It is strong and stiff and durable, being very rarely attacked by insects and having especially a good reputation for durability in wet situations, though not considered quite equal to Molave, Dungon and Ipil.

The chief uses of Pagatpat in the Philippines are for ship, wharf and bridge building, general strong construction, flooring and interior finish.

Pagatpat is easy to work and to finish. Under

varnish it takes a very dark brown color. It would undoubtedly take black stains very easily.

The trees are not as large as the largest species of the Lauan family, but still very large timbers can be obtained. The immense timbers furnished for the emperor's mausoleum a few years ago were of Pagatpat from Mindanao.

Prices. F.O.B. at mills, \$25.00 to \$37.50.

[Supplementary to the article on the same subject, published in the FAR EASTERN REVIEW of August, 1915, by Forsythe Sherfese, then Director of the Philippine Bureau of Forestry and now Adviser in Forestry and Co-Director of the Chinese Forest Service. Panels representing the typical natural appearance of all of the woods discussed in this article can be seen in the offices of the American Commercial Attache, Peking—Ed.]



LOGS OF PAGATPAT READY FOR SHIPMENT TO CHINA TO BE USED IN CONSTRUCTION OF THE MAUSOLEUM OF THE EMPEROR KUANG HSU

SUGAR CENTRAL MAY BE DEFERRED

The Philippine Government may be compelled to abandon for the present its plans for the construction of a central sugar mill at Isabela for handling the 1917-1918 cane crop. It is stated that the great increase in ocean freight rates and the increased price of metals of all descriptions will make a central plant at this time cost approximately P3,000,000, while the board has only an appropriation of P2,000,000 at its disposal. In addition to this there appears to be no firm willing

to bid on the project if a clause is contained therein obligating the firm to guarantee completion of the mill at any given date, and from the government's point of view this is indispensable.

It is pointed out that to acquire a mill at the present inflated price of materials and abnormal freight rates will mean, in addition to the greatly increased investment of the government, that after war prices have dropped and freight rates have returned to normal, the value of the mill will depreciate in like manner, and that the property itself will be then worth considerably less than it cost to the government.

BRITISH NORTH BORNEO

[BY AMERICAN CONSUL GEORGE M. HANSON, SANDAKAN]

The State of British North Borneo is governed by the British North Borneo Co., a chartered company, the only one remaining under the British flag, with headquarters in London. The government is practically the same as that instituted by the British in the government of oriental colonies. The State is under British protection. There is a governor, who is appointed by the company with the approval of the British Secretary of State, and various other executive officers. The country is divided into subdivisions, the head of each being a resident. All appointments to positions are made by the Court of Directors in London, and after 25 years the officeholder is entitled to a pension of half salary for life.

Borneo is a vast island of which little is known. Politically it is divided into four districts—Dutch Borneo, comprising about seven-tenths of the area; Sarawak and Brunei, nearly two-tenths; and British North Borneo, a little more than one-tenth. The old Sultanate of Brunei, on the northwest coast, from which the island derived its name, is now an independent British protectorate. It lies between Sarawak and British North Borneo. The island of Labuan, off the west coast of British North Borneo, is a dependency of the Straits Settlements, and its affairs are administered from Singapore. The other islands that fringe the northeast coast belong to British North Borneo. The company still pays tribute to both the Sultan of Brunei and the Sultan of Sulu. The latter lives in Jolo, in the Province of Sulu, which comprises the islands of the southern Philippines. The east coast of Borneo was formerly included in the Sultanate of Sulu.

Population of British North Borneo

The population of British North Borneo has been estimated at 500,000, but that figure is but a guess, as a large part of the interior has never been explored and no one has any idea



MR. GEORGE M. HANSON

of the number of Dusuns and Dyaks who live there. The known population is estimated at about 200,000, which includes the whites, less than 400; the Chinese, Japanese, and Hindoos, about 30,000; and the native Malays of the coast towns and island villages. The only means of transportation anywhere in Borneo is by boat, and the back country away from the rivers has never been traversed by white people. The writer is told that within 20 miles of Sandakan are natives who have never seen a white man and who live by the spear and the blow-pipe the same as their forebears of the tenth century. Their villages are hemmed in by mountains and jungle and there is no communication except when some members of a tribe go on a head hunting trip. These natives are for the most part of the lowest, especially in their manner of living. Their courage, however, is undoubted, and they make good material for any kind of police work. The inhabitants of the island and river towns are quite different. They show the effect of white occupation for between 30 and 40 years.

Civilization has stamped Borneo here and there along the coast whenever good anchorage could be found, and a number of settlements have been located a hundred miles or more apart. To these settlements have come the Chinese in great numbers and, in lesser proportions, Japanese and Hindoos. The Chinese as a rule come to stay, and many have taken wives from among the native Malays. The result is a strong Chinese strain in the population in all the towns from Sarawak around the north and east coasts to Dutch Borneo. Later followed the artisans and gardeners from Canton and Hongkong, and when rubber cultivation was started coolies were brought over in great numbers. So that Sandakan, which has a population of about 10,000, is a Chinese town. The business men generally, contractors, artisans of all kinds, skilled workmen, and clerks, are practically all Chinese. The white population is small. Oriental labor is so cheap that no white man

is employed, except in some capacity of leadership or head of a department. In subordinate positions, such as accountants, chief clerks, etc., are found Hindoos and Eurasians.

Wild Animals Numerous

A peculiar feature of Borneo is that it is practically an immense game preserve. The white inhabitants are Government officials, planters, and businessmen and have neither time nor inclination to do any hunting. The result is that the game with which the country abounds is rarely disturbed. Elephants and rhinoceroses are so plentiful that they are a nuisance to rubber and coconut estates by destroying young trees. The telegraph line across the country is out of commission a third of the time because the elephants rub against the posts and push them down. Two kinds of wild buffalo are found and many kinds of deer. As in all tropical countries, wild pig is everywhere. Many are killed every year in and around Sandakan. Crocodiles are numerous near the mouths of rivers and snakes are plentiful. The most common are the python, sometimes 25 to 30 feet long, and the cobra. The latter is venomous, as is also the swamp snake and the rainbow-colored bamboo snake. The carnivorous animals are represented by the honey bear, the black panther, and a small tiger. The black scorpion, from 6 to 10 inches long and broad in proportion, is seen occasionally. Iguanas are common, as are also anteaters, sloths, and armadillos. Orang-utans grow to a height of 4 feet 6 inches and are husky. An export duty of \$2.77 each has been put on Orang-utans, dead or alive.

Industries and Products of British North Borneo

The industries of British North Borneo are divided into two parts, or three, if manufacturing may be included. These are: (1) Cultivation of tropical products, such as tobacco, coconuts, pepper, and rubber; (2)



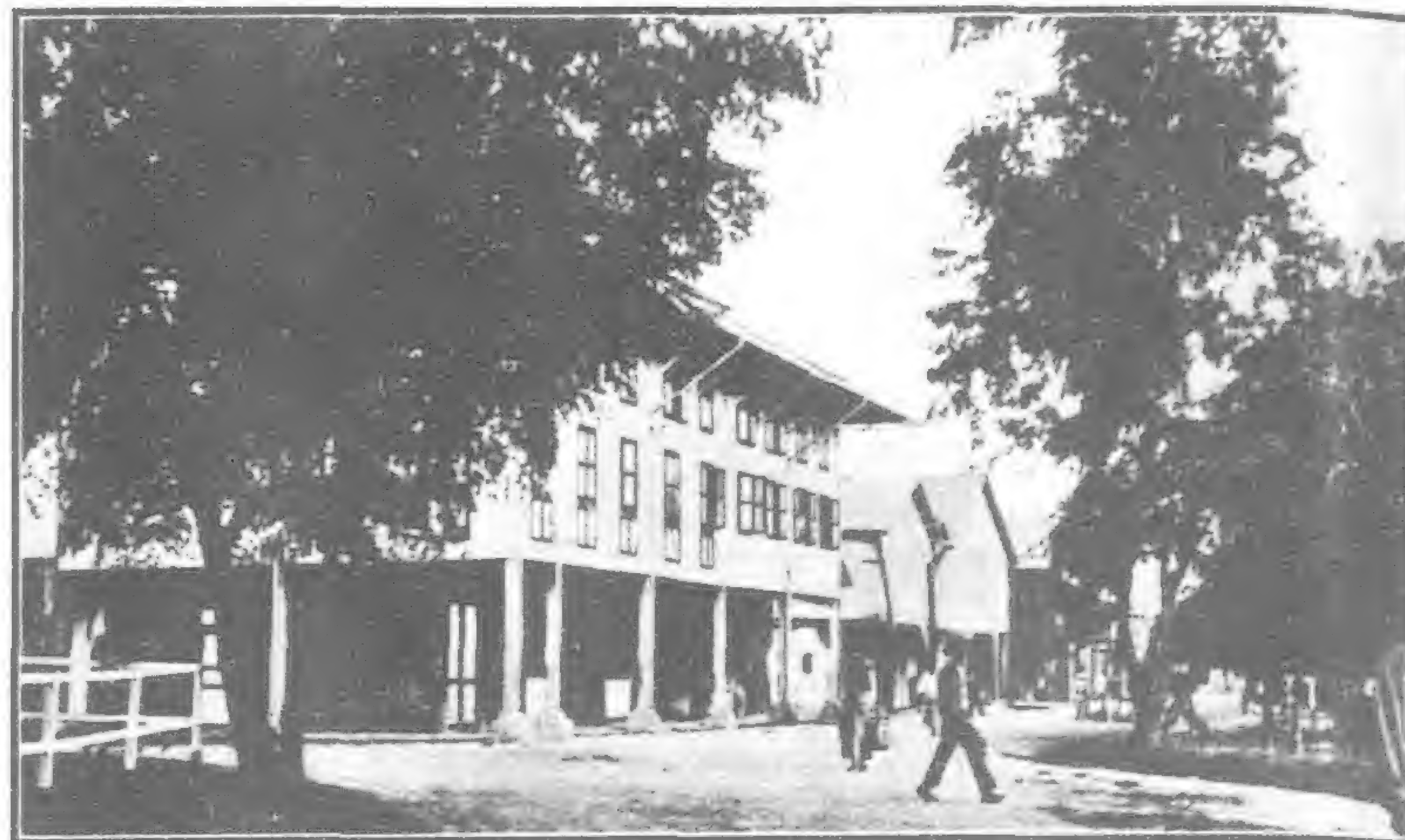
DYAK MAN AND WIFE IN GALA DRESS



TAPPING A RUBBER TREE



AMERICAN CONSULATE, SANDAKAN



SCENE ON THE BUND, SANDAKAN

gathering jungle and forest products, including timber and animal products.

Manufacturing is limited to the making of copra and cutch, the latter a dye and the product of the mangrove tree. Small boats and lighters for local use are built by the China-Borneo Co. and the North Borneo Trading Co. A small factory in Sandakan puts up aerated waters and manufactures enough ice for local consumption and for supplying ships. A small amount of coal is mined.

Tobacco and Rubber Estates

In the cultivation of tropical products tobacco has led for several years, closely followed by rubber. The tobacco estates, however, have been gradually reduced in number each year, while the production of rubber has been increasing, so it is only a matter of time until rubber will take first place. No less than 20 rubber estates, with an acreage of 26,360 and capital of \$11,970,000 are under cultivation, 12 of which are producing. Within two or three years all estates will be exporting crude rubber and in five years all the trees that have been set out on all estates will be ready for tapping. The total rubber production, that is, cultivated rubber, amounted in 1914 to 1,373,000 pounds. Considering the loss of the entire continental market, the price has kept up well, and practically every estate now producing will show a profit.

Only six tobacco estates (capital, \$1,265,900; acreage, 12,220) raised a crop for export. The tobacco growers for several years have been complaining of the uncertainties of tobacco cultivation owing to the absence of rain at the time it is particularly needed. That is the reason tobacco cultivation is not growing in favor. Both rubber and tobacco growers are inclined to the opinion that if their estates were planted in coconut trees the output would be more profitable. The coconut crop

is a natural one which rarely fails and the trees require little attention. There is always a ready sale for copra and coconut oils at prices that guarantee a splendid interest on the capital invested.

Jungle and Forest Products

The gathering of jungle produce is the one thriving business in Borneo. Outside of the timber trade, which is carried on regularly with Hongkong at profitable figures, the jungle and forest products range from armadillo skins to birds' nests. The latter are found in great numbers in the dark recesses of the immense caves which are found all through the mountainous country along the east coast. These nests are built or formed of a sort of gelatin, or masticated food, by a kind of swallow, and vary in value according to color and quality. The pure-white nests are the most valuable; the darker ones are cheaper and less palatable. Hongkong is the great market for birds' nests, where they enter into the food supplies of the wealthier Chinese.

An important jungle product is rattan. It is plentiful all over British North Borneo, and the exports for 1914 were valued at \$58,067. There are at least three different kinds, and the price varies accordingly. The cheaper kinds are used for making the blinds and mats so common in tropical buildings, while the better kinds are made into furniture, or used for whip handles, walking sticks, etc. The exports go to Singapore and Hongkong.

Other jungle products include camphor, dammar and various other kinds of gums and resins, including gum copal, beeswax, guttapercha, india rubber, fruits, etc. The supply of jungle produce could be vastly increased if the demand justified it. The business is handled by Chinese traders who arrange with the native Malays to search the jungle and bring in everything salable. These Malays, however, are naturally indifferent to work of any kind and, besides, are very superstitious. For

instance, when on a produce-gathering expedition, if a certain kind of bird flies across the trail ahead of the party, no work can be done that day; if a snake is seen and not killed, the party must return home for the day; if the cry of a certain bird is heard on the right of the trail, it is a warning that no work must be done for two days, etc. But the amount of practically all kinds of jungle produce is so great that, notwithstanding the little work done, large quantities are gathered, and the trade is a great help to the native population. The Bajaus or Sea Gypsies, Malay natives who live on the water along the east coast, add to the export trade by collecting turtle eggs, tortoise shells, shark fins, beche de mer or sea cucumbers, mother-of-pearl, clamshells, and other sea products. Their chief occupation is fishing, and the gathering of these articles is largely incidental.

Discovery of Petroleum

At least two companies have full forces at work drilling and exploring for petroleum in British North Borneo. The discovery of oil in immense quantities in Dutch Borneo and also in Sarawak has led to the belief that it might be found in other parts of the island. A Dutch company is operating at Sebatik, in the southern part of the State, and an American company has been exploring the country on the west coast of British North Borneo and also in Brunei. Oil in small quantities has been found by both companies, but not enough to flow. The wells in Miri, Sarawak, have lately been taken over by the Standard Oil Co. In his annual report Gov. Parr refers to the oil situation in part as follows:

No one with any real knowledge of this territory can doubt its potential wealth. Of the existence of mineral oil in payable quantities it is premature to speak, but indications are promising in some of the localities prospected. The existence of mineral deposits



BRITISH NORTH BORNEO TOBACCO PLANTATION



DAVAL BAY TOBACCO PLANTATION'S OFFICES



DYAK CHILDREN, WEARING CORSETS OF BRASS WIRE



NATIVE HOUSES IN BRITISH NORTH BORNEO

remains to be proved, and I trust that efforts will be made in the near future to prove it; possibly the expert geologists employed by the oil companies have some exclusive information on the subject, but if so they are naturally reticent, and as far as one can foresee in the present stage of development, the future prosperity of the country depends chiefly on agriculture and the timber of its magnificent forests.

Large Timber Supplies

Probably the greatest natural resource of British North Borneo is the supply of timber, as practically the entire surface is covered with forests. Both hard and soft woods are found in large quantities, and the export to Hongkong has become an important item of commerce. Steps are being taken by the Government to develop the timber possibilities, and if present plans are carried through there ought to be a market for several up-to-date American sawmills, together with logging equipment, etc.

Exports to United States

The exports to the United States are limited to two articles—cutch, an extract from the bark of the mangrove tree, and crude rubber. Cutch is manufactured on a small scale at Sandakan, and regular shipments worth about \$10,000 a year are made to the United States. It is used as a dye, for tanning purposes, also as a preservative when applied as a varnish. The possibilities for the production of cutch are unlimited, as the entire low country bordering the coast and around the mouths of rivers is covered with mangrove trees. After the bark is stripped the wood is used for fuel. Large quantities are shipped to Hongkong.

Shipments to the United States of para, or crude rubber, were worth \$11,500 in 1914 before the embargo laid on the export of rubber to foreign countries was declared by Great Britain. Ordinarily all Borneo rubber is either shipped overseas direct or is disposed

of in Singapore, whence it goes to all parts of the world. American purchasers who deal direct with producers in Borneo will save the commission which otherwise would go to the middleman in Singapore.

Exports to Philippine Islands

The \$25,000 of exports to the Philippine Islands represents for the most part general merchandise and food supplies which go to the Chinese stores in Zamboanga and Jolo from branch houses here. It is customary for the larger Chinese firms to have branches which can be supplied by a regularly established steamer service, and in that way considerable merchandise is sent from here to the southern Philippines. Some lumber in the shape of camphor wood, highly valued for building purposes as it is considered ant proof, is shipped. The largest single item in the Philippines trade is coal. Skippers of local steamers state that Borneo coal is preferable to either the Japanese or Australian article, because it does not "clinker" and leaves very little ash. The 3,020 tons sent to the Philippines last year was for the civil government at Zamboanga. It is customary for coast guard boats and vessels in the customs service of the Philippines to coal at Sandakan. The mines are situated in the southern part of the State, close to the Dutch boundary line, and the coal is brought to Sandakan in large lighters.

Total Import and Export Trade

There is no record kept of the countries of origin of imports into or the countries of destination of exports from British North Borneo. The imports during 1914 were valued at \$2,642,710, compared with \$3,021,603 for 1913. The value of the exports decreased from \$4,110,061 in 1913 to \$3,477,935 for 1914.

In both imports and exports the trade for 1914 suffered considerably, due undoubtedly

to the war. The long-continued drought affected the tobacco crop and to that cause may be attributed the loss of nearly \$600,000 in the exports of this product. The loss of \$85,000 in rubber exports was due in part to the drought, but mainly to the demoralization of the trade at the beginning of the war. Of late prices have picked up and better things are hoped for by estate owners.

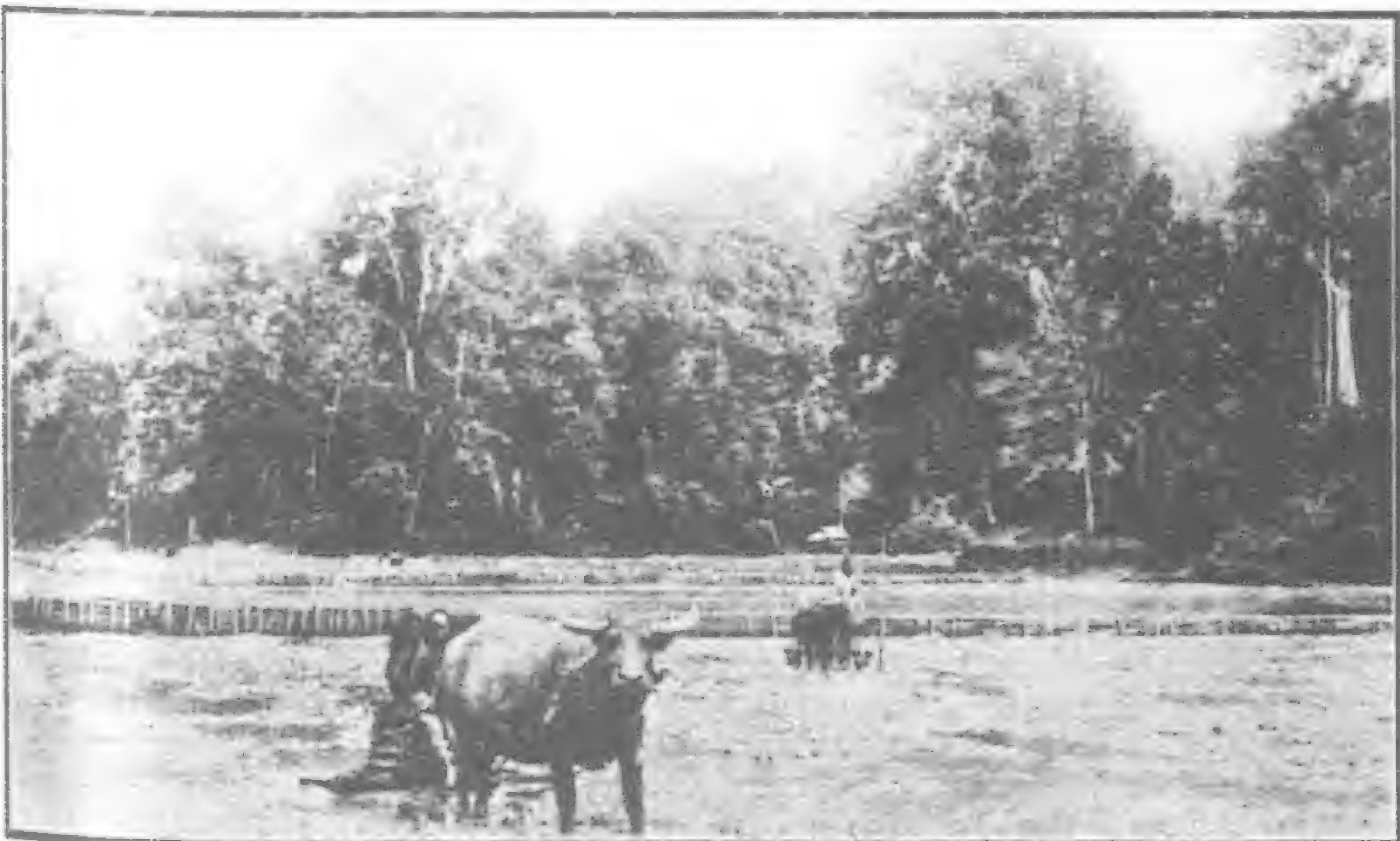
The great loss in the exports of sago is accounted for by the elimination of sago palms in clearing land for rubber estates. There was also a decrease in the exports of birds' nests, coal, dammer, including gum copal, gambier, gutta-percha, india rubber, pepper, and rattan. Timber about held its own. The decrease in the shipments of hemp was due to the loss in imports from the Philippines. The gain in the export of opium was due to the fact that the island of Labuan, under the Straits Settlements, is supplied from British North Borneo. Rhinoceros horns are shipped to Hongkong, where they are valued highly when ground as an ingredient of Chinese medicine.

Items showing gains in the exports included copra, cutch, opium, dried fish, beeswax, and hides.

The imports show a falling off in the total of nearly \$400,000, largely in cloth, opium, rice, flour, and grain, and treasure. The great loss in railway and telegraph materials is not significant, for the reason that the wireless plant has been completed and the construction of the railway line on the west coast has been finished. The other losses can be charged largely to the war. Less opium was smoked and less provisions consumed. Many coolies returned to China after war was declared and the consuming capacity of the community was diminished.

Opportunities for Trade Extension

The collector of customs informs the writer that the imports from the United



HARROWING A RICE FIELD WITH WATER BUFFALO



STREET SCENE NEAR SANDAKAN

States come mainly by parcel post. Trade with the United States does not amount to much, nor can much be expected. There can be no commerce without people who buy and sell, and the commercial population of British North Borneo is too small yet to have any effect on world trade. It should be borne in mind that this is a tropical country, where the wants of the natives are few and the native trade, therefore, is insignificant. As for the rest, a population of less than 400 Europeans, scattered over an area nearly as large as the State of Maine, has not enough needs to make the demands of trade interesting except to the country that has the transportation facilities.

The trade connections and transportation facilities are all British. The result is that nearly all principal exports except rattan and timber go to London and all imports come from there. There is practically no independent buying in Borneo. The business houses here are, for the most part, merely branches of parent houses in Singapore, and all stores and shops are supplied through Singapore. Since Singapore is British, naturally its source of supply is principally British. But Singapore is a large shipping center and distributing point, and besides is a free port. It would be to the advantage of American exporters to seek an outlet for their wares in Singapore

rather than look for trade in the remote cities of the so-called Malay Archipelago. At Singapore all imports and exports for a district comprising a population of at least 100,000,000 people are transhipped. Singapore is the hub of the wheel where all trade and commerce for this vast district centers.

Transportation and Mail Facilities

Since the war transportation facilities have improved in that now there is competition, whereas before the war only one line of steamers was scheduled from Singapore. A Chinese company is competing with the subsidized steamers of the Straits Steamship Co. from Singapore to the southern Philippines, calling at all Borneo ports, with the result that there is a weekly service to and from Zamboanga and Jolo.

An important aid in the administration of civil affairs is the wireless plant, consisting of four stations, one each at Jesselton, Kudat, Sandakan, and Tawao, recently installed. All stations can be used for communication with the Philippines.

Other Improvements

Among the improvements carried out in 1914 may be mentioned the reclamation work at Jesselton, including the construction of a new steel and concrete wharf; an addition to

the wharf at Sandakan, so that now two ordinary cargo steamers can dock at the same time; the completion of a new dam for the catch basin reservoir at Sandakan; the building of a hospital for the insane; and the continuous work of improvement on the roads. A large hotel has been built at Jesselton and an electric light scheme has been projected. A new laboratory has been constructed for the principal medical officer at Sandakan and new quarters for the lepers at Bahala Island have been completed. All public work, such as road improvement and keeping streets and parks in repair, is done by Chinese women.

The total revenue of the government during last year from customs duties, both imports and exports, extraordinary receipts, such as revenue from opium, liquor, and gambling monopolies, and revenue from land taxation, telegraphs, harbor dues, etc., amounted to about \$1,110,000. The published administration report does not, however, include a summary of expenditures, so it is impossible to even approximate a balance sheet as to the net annual income. The action of the Chartered Co. in setting aside large sums for improvements, together with the policy of aiding financially many of the estates in tiding over bad seasons, indicates, however, that the treasury is in good shape.

THE SOUTHERN SHAN STATES RAILWAY

The Southern Shan States Railway has occupied prominent public attention of recent years, but we do not think it is fully realized that this project is distinctly of a mountain character in its climb to the wheat-growing uplands, but the photograph which we are privileged by the courtesy of the Indian Railway Board to reproduce in this issue will serve to bring this home. It was the highly successful results which followed the introduction of wheat cultivation in the Southern Shan States which rendered necessary railway communication between the wheat-growing districts and the port of Rangoon. Surveys were sanctioned as far back as 1900 for a light line from some point on the Rangoon-Mandalay section of the Burma Railways to Taungyi. This work was carried out during 1901-02 and showed the prospects of the railway being remunerative as very doubtful.

The projected line was to start from Nyaungyan, about 299 miles from Rangoon, and terminate at Sanghai, which is 7 miles short of Taungyi by the cart road. It would be 112.2 miles in length and was estimated to cost, on the 2' 6" gauge, Rs. 6,857,667, being at the rate of Rs. 61,110 per mile.

As a result of further investigation later it was determined that the railway should be constructed of the same gauge as the parent line, viz., metre, the junction being at Thazi.

Altogether 70.25 miles have now been opened for passenger traffic, of which 16.05 miles were opened in June, 1912, 6.95 miles in August, 1913, 40.46 miles in February, 1915, and the last section 7.19 miles from Kalaw to Aungban on 19th March, 1915. The through mileage from Rangoon of the section now open is 305.91 to 375.99 miles, and it is now proposed to extend the line on to Heho, a distance of 19.31 miles.

The project, as noted above, was undertaken in order to assist in developing the Southern Shan States, and in particular to serve the trade of the fertile valley of the Inle Lake which lies some 33 miles beyond the present terminus of the Railway. It will also facilitate the civil administration of the States.

At Thazi the climate is not unlike that of the Punjab, and the line, running east, commences at the fifteenth mile to climb into a tangled mass of forest-clad hills and precipitous river gorges, until at mile 63, Kalaw is reached. Here the railway enters a country

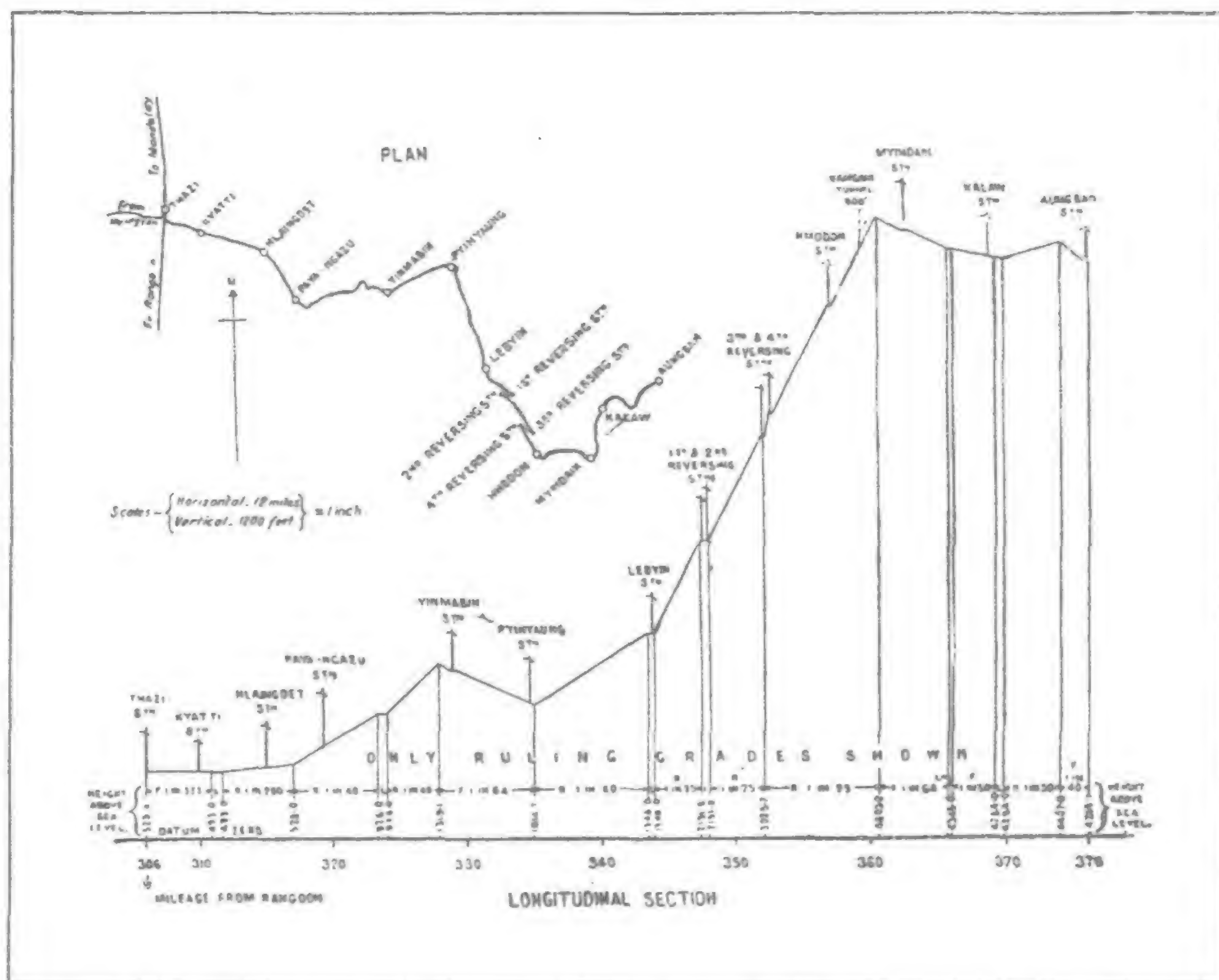
of rounded grassy hills and pine woods where the climate is pleasant and temperate.

It is expected that Kalaw will gradually develop into a popular health resort for Lower Burma, for which it possesses many natural and physical advantages.

The profile and plan of the line (skeleton diagrams of which are given) indicate the natural difficulties which, together with the scarcity of any kind of labour and the unhealth-

thy climate of the foot hills, have had to be overcome by the engineering staff in constructing the line.

The cost of extending the line from Aungban to Heho has been estimated at about Rs. 19 lakhs; but the further extension, Yongwe from Heho, only another 14 miles, would, owing to the difficult nature of the country, probably cost as much as Rs. 40 lakhs, or an average of nearly Rs. 3 lakhs per mile.



PROFILE AND PLAN OF SOUTHERN SHAN STATES RAILWAY

PHILIPPINE GOVERNMENT'S PROPOSED PURCHASE OF THE MANILA RAILROAD

Latest advices from Manila are that the plan for the purchase of the Manila Railroad Companies' lines, has been approved by the Commission and has been introduced into the assembly where it was referred to the Committees on Appropriations, Railroads and Franchises. The measure, which consists of a short introductory clause, followed by the full text of the memorandum agreement, is titled as follows:

"A bill ratifying the memorandum agreement of the 18th of December, 1915, between the governor general and Horace L. Higgins in representation of the Manila Railroad company, and the Manila Railroad company (1906), Ltd., appropriating funds for the carrying out of the contract, conferring upon the governor general the right to vote the stock acquired by virtue of the contract, and for other purpose."

In the memorandum agreement reference is made first to the government's having guaranteed four per cent interest on the bonds of the new southern lines of the company.

Next reference is made to the loans of the government to the company to enable it to continue the construction of those lines, the company being unable to secure capital elsewhere and being confronted with stoppage of its construction work. The government's loan, from the gold standard fund, now amounts to P5,637,000.

The funded indebtedness of the railroad company is then discussed. The manner in which the government is to assume the company's indebtedness provides:

That the four per cent bonds whose interest is guaranteed by the government, and of which \$10,575,000 have been issued, shall be extended for twenty years, that is to May, 1935, such extension applying also to the government's guarantee of 4 per cent. After being taken over by the government the company will establish a sinking fund to meet its bond issue obligations, the first three annual instalments of such payment, pending the 20 year extension, being P500,000 each, provision being made for the consent of the bondholders.

The government agrees to lend to the railroad company an amount sufficient to maintain the sinking fund at the required figure and it is stipulated that such portion of the sinking fund as is deposited by the railroad company shall be invested only in the purchase of the 4 per cent bonds, which, on purchase, shall be cancelled. Provision is made, on maturity of the 1 per cent bonds, for the sinking fund to be applied to taking up such of the bonds as have not been purchased and cancelled.

It is provided that the Government purchase all the capital stock of the company now outstanding, amounting to P8,000,000. Of this amount 50 per cent is to be paid on the date of sale and the balance within 18 months thereafter. It is set forth that the railroad company has advanced P9,730,650 to the construction company. Provision is made for the adjustment of this and all other accounts and the obliteration of the construction company.

The railroad company is required to refund at par and cancel all the outstanding \$4,330,000 first mortgage 6 per cent bonds and \$7,716,000 second mortgage 7 per cent bonds and issue in lieu thereof new bonds maturing

at the expiration of 40 years from date of sale bearing interest at 5 per cent instead of 6 and 7 per cent. The issue of new 5 per cent bonds shall not exceed in the aggregate the principal amount of \$13,336,000. The net balance due the construction company to be paid by bonds of the railroad company.

Provision is made for the government, on acquiring a majority of the stock of the railroad company by the first payment of P4,000,000, having the right to change the personnel of the board of directors and to nominate new



PRESIDENT HORACE L. HIGGINS

directors and officers of the railroad company, including the general manager and counsel.

The agreement is signed by Governor General Harrison and acting Executive Secretary Ferguson, representing the government, and by President Horace L. Higgins and P. A. Alexander, representing the company.

Harrison's Statement

In his lengthy statement to the legislature in support of the proposed transaction Governor General Harrison sets forth that the price finally agreed upon was eight million pesos or approximately 70 per cent of the face value of the stock of the company, which, of course, does not include the funded indebtedness and other liabilities, the total running up to P70,000,000 and over.

After setting forth the terms of the agreement, the chief executive then declares that public ownership is desirable because the railroad is a public highway and "should be operated for the benefit of those served thereby rather than for the financial benefit of private stockholders." Continuing, he says: "A railroad is, in the very nature of things, a monopoly, and experience throughout the world affords convincing arguments in favor of the ownership and control of such monopoly by the people themselves." Looked at from the standpoint of the Filipino people and their future, the perpetual franchise granted the company is declared unwise, and the advantages of abrogating it set forth.

Reference is then made to railroads owned by the government in other countries, the example and experience of Japan, the Dutch East Indies, and British India being especially dwelt upon.

Next is brought up the controversies and friction the government has had with the representatives of the company; the lack of capital, due to the war, tying up further construction work; and the manner in which the government will finance the deal out of its own funds. The governor general then points to a certain saving resulting from the purchase price, as follows: "In consideration of the price of eight million pesos agreed upon for the P11,567,000 par value of outstanding capital stock, the construction company, which is the owner of all of the outstanding 6 and 7 per cent first and second mortgage bonds of the Northern Lines, has agreed to a reduction in the rate of interest upon such bonds to 5 per cent, which will result in a net interest saving of P395,240 to the Manila Railroad Company. It is this saving which gives in my opinion value to the outstanding stock of the Manila Railroad Company."

Speaking of the annual deficits the government had to make good under its guarantee of four per cent interest on the bonds of the southern lines, the governor general states that in 1910 the amount was approximately P19,000; in 1914 it was P51,631.26; and in 1915 the estimated deficit on October 31 was P82,900. In addition the company suffered a loss on its northern lines which might amount to about P100,000, which had been financed by a temporary release of certain of the company's bonds held by the government.

Moreover, until the completion of the present construction plans of the company each year would impose greater interest obligation inasmuch as the new road had been built in sections and these could not be expected to pay for themselves until they had been linked up.

In conclusion the governor general was not very optimistic in regard to the government's management of the road proving a financial success, but he thought this was of less importance to the people of the Philippine islands "than that the road should be operated in such a way as to develop as quickly as possible and to the utmost the country served and the expansion of commerce in the Philippines." Still further, in a large sense, the very acquisition of the railroad system would remove the railroad from politics.

The proposal has met with opposition from the American press in the Islands and also

NATIVE DYES OF CHINA

from a considerable portion of the native press. The objection is not the question of price, but that it is unnecessary, and that the money to be withdrawn from the sinking funds now lying dormant could be better expended on such important matters as irrigation, agricultural development, road and bridge building, and sugar centrals. "*La Democracia*," one of the leading Filipino papers, frankly confesses that the proposed purchase of the railroad comes as a surprise and that, on investigating the cause of the deal, it has discovered that the English companies operating in the transaction are desirous of disposing of their property as soon as possible so as to employ their funds for war purposes. The journal reminds the government of the inadvisability of undertaking this project at present, as the country is in a very precarious situation economically, while government indebtedness will annually increase and so add to the great burden the country is carrying. The American press in the Islands also considers the purchase of the railway as all-advised and unnecessary. The *Bulletin* closes a long editorial as follows:

"Some day the islands are going to need all their credit in order to borrow money on their bonds to acquire these things, only to find that credit has been exhausted to purchase a railroad, which the country needs about as much as a cat needs two tails. The country will have the railroad but will be unable to trade it for real needs. The only advantage that will accrue to the people will be the privilege of raising several additional millions of pesos in taxes to pay the interest on the indebtedness incurred by the purchase.

"The most essential factor in the future as well as present prosperity of the islands is the coming of capital for the development of its natural resources, industries, and public utilities. The largest investment of capital in the islands up to the present is that invested by the Manila railway. Is the government to announce now to the financial world that the government is to be the means of sending this capital out of the country? Will such action encourage other capital to enter the country?

"We do not know what political benefit is to be derived by the purchase of this railroad. One thing is certain; there will be no economic benefit derived from it. The only expert opinion available of the value of the road is that of the government itself. In a decision by the public utilities board, seven months ago, that body said: That the company's income is not sufficient to provide adequately for the protection of its property devoted to public use, to pay its fixed charges, and to pay a reasonable return upon its investment, is shown by the following comparative statement of its income account for all lines for the years 1910 to 1914, inclusive. Is the credit of the country to be mortgaged for generations, in order that the government may acquire a property of this kind? Will government ownership and management get better result than experienced and competent railroad officials have accomplished? If they are then the people should have some knowledge of why and how it is to be done."

NANKING TRADE CONDITIONS

According to a Japanese Foreign Office report business in Nanking has not suffered from the effect of the war situation in the south-west of China. But the city is in a state of depression as usual owing to the close of the year. Owing to the European war prices continue to rise. As for Japanese goods, the Chinese merchants are ordering them in view of future sales, so that the number of transactions is rather large. The banks are cautious and the money market is generally depressed. At the same time the issue of bank notes by the National Bank and the Bank of Communications has increased considerably, which is a notable feature. The amount of circulation cannot be known exactly; but it is about 23,000,000 yuan, of which about 700,000 yuan was issued recently.

A writer in the *British Chamber of Commerce Journal* (Shanghai) says:

"The subject of dyes is occupying so much attention at present that the following notes on native dyes may be of interest to readers of the *Journal*. Classification according to colours has been adopted as the easiest method of distinguishing the dyes. These colours are—blue, green, yellow, red, black, and brown:—

"BLUE.—The most common dye employed in China is blue, produced from the 'indigo' plant. There are in reality four plants cultivated for this purpose, viz.; (1) *Strobilanthus flaccidifolius*, found in central and western China; (2) *Indigofera tinctoria*, a leguminous shrub cultivated in the south and in India; (3) *Isatis tinctoria*, resembling the woad of the ancient Britons, and (4) *Polygonum tinctorium*, the dyers' knot weed of Manchuria, Hupeh, etc. Of these four the *indigofera* appears to be the most widespread. The principal indigo-producing districts are—or were, for cultivation on a large scale has owing to the competition of foreign dye-stuffs, died out in some provinces—the Sungari basin in Manchuria, Anhui province near the Yangtze, some districts in Kiangsi and Hupeh, central Chekiang, and, in the South, more especially on the West River in Kwangsi. It is, however, grown for local use in practically every province, and is a staple article of Hainan Island.

"In some parts of China three crops of indigo leaves are gathered yearly—in July, August, and September. One *mu* of land yields over 700 catties of manufactured dye if the crop is good. The shoots are steeped in concrete pits for several days in cold water, when they are removed, leaving a greenish water, which, after being well stirred and exposed to the air, becomes darker. Slaked lime is placed in the water to precipitate the indigo, and, when the water is drained off, the dye is found deposited at the bottom of the pit.

"The history of the indigo trade is interesting, as revealed in Consular and Customs reports. As far back as 1878 it was predicted that native dyes, then cheap would be supplanted by cheaper and more dazzling substitutes, the people having a taste for bright colours which they were only prevented from indulging by the incident of cost. Large quantities of indigo then came down in carts from Central Manchuria to the coast; Hankow exported a great deal, and Wuhu imported 40,000 to 50,000 piculs yearly. In the south the exportation from Kwangsi reached high figures, between 40,000 and 70,000 piculs being the annual shipments through Pakhoi and Wuchow also sending many thousands of piculs down the West River to the dye-works at Fatshan and other towns in the neighbourhood.

"The exportation to foreign countries never reached high figures, as the dry article as required in Europe is not produced. In the early seventies a Commission was sent to Hankow to investigate Chinese indigo, but interest died out, as the colour was found to be too dull to compete with the more brilliant arsenical dyes used at home. It is in the middle eighties that the first reports are heard of the competition of foreign dyes. In 1886 the Consular Report for Chinkiang says that foreign dyes are displacing native for dyeing silk and the finer kinds of cloth. They cost £6 per case of 250 bottles, while only one picul of indigo could be bought for the same sum. The foreign dyes can also dye a greater number of pieces than the native, but the Chinese dyes stand washing better, and do not fade. Dealers in native dyes were finding that their business was becoming confined more and more to coarse foreign cloth and to native

cloth. Aniline dyes in bottles first appeared at Hankow in 1882, and made rapid strides; they first appear as a 'principal article' in the Customs Returns in 1886, when Hk. Tls. 700,000 worth were imported to China. The million tael figure was reached in 1893, by which time reports were general that native dyes were being displaced. However, indigo shared in the great development of trade—internal and foreign—which was the feature of Chinese industrial history during the years between the China-Japan War and the Boxer Rising. The development of steamship traffic and the first stirrings of the awakening of the country from its long quiescence caused the opening of new avenues for native trade, which showed a marvellous capacity for expansion. Thus we find Swatow exporting 93,000 piculs of indigo in 1898, and Pakhoi which twenty years before had only produced 15,000 piculs, in 1899 sent away over 84,000.

"But the trade had reached its highwater mark, and from the end of the century there has been a continual decline in the production of indigo, due to the competition of aniline dyes and synthetic indigo from Germany and Belgium. This latter article first appears in the Customs Returns in 1902, when 3,265 piculs worth Hk. Tls. 131,224 were imported to China. Three years later, such was the popularity of the dye, and so great the energy with which its sale was pushed, this figure had increased, tenfold, and in 1913 the figures were Piculs 314,268 and Tls. 9,528,670—a truly remarkable development! In the same period aniline dyes ran an almost parallel career. In 1902 the value of imports was Tls. 2,180,000 and in 1913 Tls. 5,352,000. The struggle between this German monopoly and native indigo and other dyes was over.

"This result had been predicted time and again by British Consuls. In 1901 it was pointed out in the Report on the Trade of China that native indigo, would, as in India, have to enter upon a severe struggle, of which the issue could not be in doubt. In 1908 it was stated that vegetable indigo was being gradually superseded, the same complaint coming from Shantung in the north and from Pakhoi in the south. Artificial indigo was not at first much used for foreign shirtings, as it washes out, but for native cloth, but on the other hand native dyers found that not only was it cheaper, but it had the quality of imparting a clear blue colour, with faint sheen—a colour and appearance which was unobtainable with their own dyes. It was said (in 1911) to be extensively used in Hunan, and in Manchuria. Shantung and Honan were supplied with aniline dyes and artificial indigo from Tsingtau. In the south native dyers still preferred the liquid indigo on account of its imparting a more uniform colour to the cloth.

"Since the outbreak of the war Chinese dyers have felt the want of foreign dyes severely, and indigo cultivation has revived, but in the near future the importation will be renewed. The British Consular Report for Shanghai, 1914, expresses the hope that the new British dyes will be placed on the China market, and that an efficient distributing agency will be arranged, for the trade offers very fine prospects. In this hope all who have the interest of the Empire at heart will agree. It is trusted that the present imperfect sketch will stimulate interest in this question. Now that the monopoly established by the Germans in the production of the dyes no longer exists, the example of their pushfulness in this trade, as illustrated by the figures given above, may well be followed.

"RED.—The best known red dye in China is safflower—*carthamus tinctorius*—*hu g hua*. The seed is said to have been originally brought to China by the famous traveller and general Chang Chien from Turkestan, and the

chief centre of production is central Szechuan, though it is also cultivated near Ichang and in N.W. Anhui. A generation ago the export from Hankow amounted to 6,000 piculs, but at present the industry is practically extinct, the dye being used now only for fine silk. The red worsted cord, for which Wuhu was famous all over the Empire, was dyed with Szechuan safflower.

"The balsam—impatiens balsamina, or *chih chiu hua* (finger-nail flower) is used in combination with alum as a finger-nail dye, called *hai-na*, apparently in imitation of the Arabic henna. Other plants used for the same purpose are *anhusia tinctoria* in the north and *lawsonia alba* in the south, the latter produces the familiar rouge employed by Chinese ladies. *Madder—rubia cordifolia*, the Chinese *ch'ien ts'ao*, is a creeper whose stems and roots are employed to dye a deep red, whence its name *ian-fai ts'ao*. A purple dye is extracted from the bark of *lithospermum erythrorhizon—tsu ts'ao*, now used chiefly as a drug in the northern and central provinces. The colouring matter is brightest if the plant is dug up in spring. Formerly 4,000 piculs of this dye were exported from Chefoo yearly, and sent to the south. Sappan-wood dye from Malaysia and the Philippines is an important article of import.

"YELLOW.—Turmeric is the product of *longa* or *yin chi*, found in Szechuan and Tibet and also on the delta of the West River of Kwangtung and in Formosa, whence it is imported to China. The powdered roots are used for dyeing cotton cloth, especially women's clothes. The export of this dye from Chungking reached the extraordinarily high figure of 60,000 piculs in 1912, apparently owing to the failure of the Indian crop. The normal exportation is very much lower. The plant is still extensively cultivated on the Lower Min in Szechuan.

"A yellow dye for silks and cottons is obtained from the buds of *sophora japonica—huai shu*—a familiar tree widely scattered over China. The *koelreuteria*, also named *huai*, is used for the same purpose. The

gardenia florida produces a yellow dye used for staining woods.

"GREEN.—Green dyes are obtained from the leaves of *thamnus tinctorius* and other species of buckthorn. The bark of two varieties is boiled together in Chekiang to produce the dye, which is very expensive, and so sparingly used—mostly for dyeing grasscloth. It is a very permanent colour, and constitutes the sap-green of water colour painters. The pigment is named *lu-chiao*. It has been almost totally displaced by aniline dyes, and the same fate has overtaken the dye obtained from a species of *polygonum* in Szechuan.

"BLACK.—The 'nutgalls' produced on the *rhus javanica*—the *fu-yang* tree—are extensively employed for dyeing fabrics—especially silk-black. The cloth must first be dyed blue. This process has been elaborately described by Hsieh in his report on Szechuan. Mixed with cochineal and other colouring substances the powder from the galls (Chinese *cupei-tzu*) produces grey, brown, and fawn tints. Nutgalls are also largely used in tanning. The history of the export trade in this article is one of continuous upward progress from the time when records were first kept (the early sixties), when only a few thousand piculs were sent abroad each year. In 1876 over 20,000 piculs, at about Tls. 10 each, were shipped, the thirty thousand piculs figure was first reached in 1887. In 1888 the general mourning in Germany stimulated the demand, as nutgalls were needed to make black dyes, and since then the demand has never fallen off. Here again Germany, not despising the "muck-and-truck trade," was ahead. In 1893, 48,000 piculs, worth Tls. 570,000 were exported, and in 1906 58,000 piculs, worth almost a million. The record year was 1909, with 66,337 piculs, and the price, at Customs valuation, is now from Tls. 17 to 20. As the Occidental demand is greater than the supply, this trade is worth developing by British merchants, who appear to have allowed it to fall into other hands.

"BROWN.—The dye yam (*shu liang*) or false gambier yields a dark brown dye and tanning agent, commonly used in Yunnan and export-

ed thence to Tongking. It is also widely grown in Kwangsi, and shipped to Kwangtung from Wuchow. It is used for native and foreign cottons, grasscloth and silk, and furnishes the lustrous dark-brown waterproof-looking colour so much affected by Chinese in summer. If a darker colour is required alum and nutgalls are added and in Canton the juice of green or unripe persimmons is frequently applied as a varnish to the outside of the cloth. It is waterproof, and perspiration does not show upon it, to remove dirt only superficial washing is necessary.

"From the artistic point of view the revival of the beautiful vegetable dyes is to be welcomed, as the substitution of chemical dyes has led to a sad degeneration of taste. Many years ago Wardle, the silk expert, observed with regret how the love of the modern gaudy European dyes had seriously affected the products of the native loom in India. This applies, however, to silk and grasscloth rather than to coarse cotton goods, and the principal question at issue for commercial men is the displacement of German dyes by British."

"Note.—The naturalist E. H. Wilson states that the galls produced on a less common species—*rhus potaninii* and named *ch'i-pei-tsu*, which are used in Chinese medicine, possess possibilities worthy of investigation in connection with the quest for an indelible black ink.

"As a dye for silk the cupules of two very common oaks—the *hua-i* and *hua-k'o-li*, are employed. Used with sulphate of iron a dye is produced very similar to that extracted from the *vallonea* oak of Asia Minor. In dyeing silk with this dye the fabric does not require to be dyed blue first. This dye is used in Manchuria, Hupeh, and the West generally. In the country districts of Szechuan local use is made of the leaves of the walnut, alder, tallow-tree, etc., for the same purpose, and soot from pine wood, mixed with millet spirit is also used."

RUSSIA'S FORESTS

Russia now occupies first place among the nations of the world in the extent of its timber resources, the value and quality of two-thirds of which are practically unknown. The total area of the empire is about one-seventh of the land surface of the globe, and 39% of it is under forests. Those in European Russia cover an area of 474,000,000 acres; in Finland, 50,000,000 acres; in Poland, 6,700,000 acres and in the Caucasus, 18,600,000 acres—a total of 549,300,000 acres, exclusive of Siberia. In the Ural Provinces forests cover 70 per cent. of the area, in the northern provinces 68 per cent. and in the four lake provinces 57 per cent. It is estimated that in western Siberia alone there are 465,000,000 acres of virgin forests, and eastern Siberia, while not so richly endowed, has sufficient timber to supply the world's demand for years to come.

The government owns 285,598,941 acres of forest land in European Russia, 12,826,387 acres in the Caucasus, 300,519,435 acres in Asiatic Russia, and 288,742,000 acres in the Amur region, a total of 947,686,763 acres. Twenty-three per cent of the forest land belonged to landed proprietors and 9 per cent to the peasantry in 1910.

The principal timber lands of eastern Siberia are in the valleys of the Amur River system, which cover an area of about 2,000,000 square miles. Of this area, only about 400,000 miles is considered available for timbering, but according to local calculations, allowing 45 merchantable trees to the acre, this would give some 11,520,000,000 trees. As the time required for these trees to mature is placed at 100 years, 115,200,000 trees could be cut per annum without diminishing the forests, with proper reforestation methods. The Russian forestry department places the total timber land in

Siberia at 810,000,000 acres, of which two-thirds can be successfully placed on the market.

The disturbed conditions of Russia, generally speaking, have not, however, stopped the work of developing the local forests. There are in course of organization two strong Russian companies, which are anticipating going heavily into the export of timber abroad. It is still too early to state anything definitely about them, but it looks as if one of them at least will begin this Winter. In two or three years these companies promise to have a visible effect upon timber industries and their influence will soon be felt in the Pacific timber market.

It is quite possible that these companies will not only apply to American manufacturers for the equipment of their factories, but even invite American specialists for the organization of the whole business. The plan includes not only large sawmills, but also box factories, pulp, matches and dry distillation of wood.

REFORESTATION IN JAPAN

The forest area of Japan is decreasing at the rate of 1,000,000 acres a year. This area is being cut away partly for timber and lumber and for firewood, and partly to make the land available for the cultivation of rice.

The total of forest lands in Japan for each year from 1909 to 1913, inclusive, was: 1909, 54,032,565 acres; 1910, 52,048,464; 1911, 47,038,230; 1912, 46,989,298; 1913, 46,231,458.

During the period for which statistics are given the forest area decreased by approximately 1,600,000 acres a year on an

average. Estimating the annual decrease at this figure the forests of Japan at the end of 1914 covered about 45,000,000 acres.

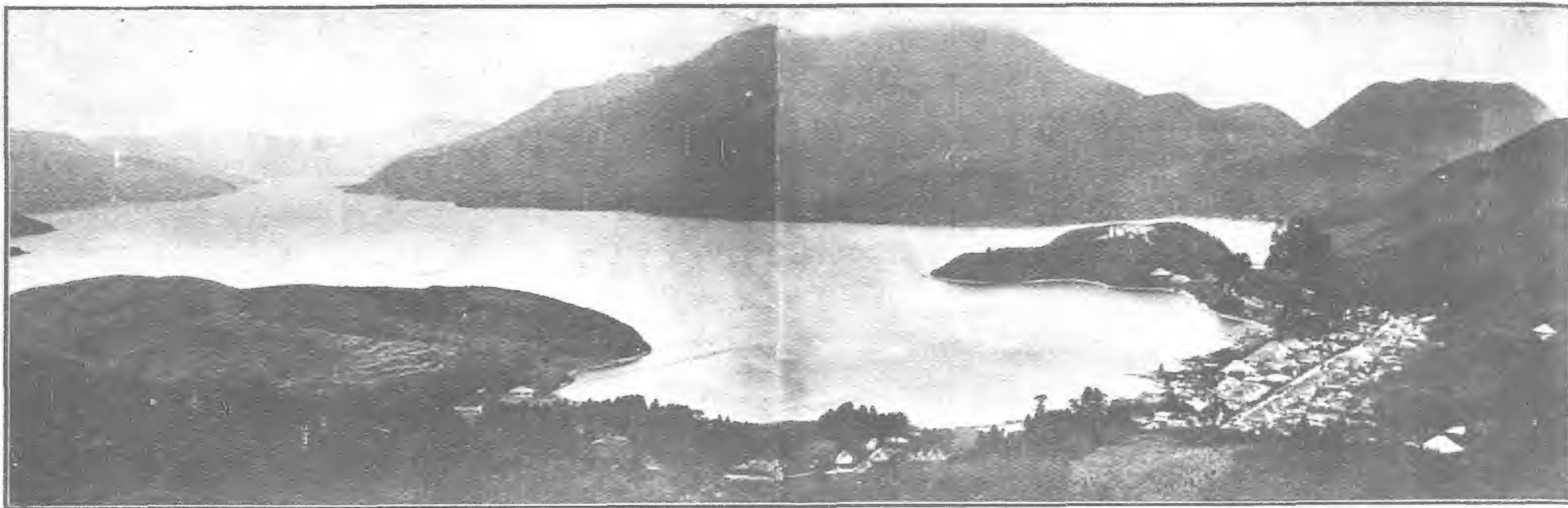
The value of lumber and firewood for these years were in 1000's of Gold dollars.

Years	Lumber	firewood	Total
1908-09	\$23,810	\$14,223	\$38,034
1909-10	22,834	15,104	37,939
1910-11	21,293	12,928	35,222
1911-12	22,436	14,753	37,189
1912-13	24,045	15,222	39,268

The sale of timber from government-owned forests is a source of considerable revenue to the state. In 1914 the budget for the fiscal year 1913-14 estimated this revenue at \$5,359,845, in which are included the receipts from the sale of state-owned forest lands. The expenditures for upkeep, supervision and reforestation were estimated at \$2,326,811, giving the government a profit of \$3,033,034.

BRITISH INDIA MINERAL OUTPUT

According to the report of the Chief Inspector of Mines in India the output of coal in that country last year was 15,727,631 tons, an increase of 241,313 tons over the output of 1913. Of the total output 95.85 per cent. came from Bihar and Bengal. For the first time since 1910 there was a decrease in the output of mica, 38,189 cwts. having been raised. The output of manganese was 555,672 tons. This was a decrease of 81,719 tons. The gold output of the previous year was nearly doubled, being 19,873 ozs., an increase of 80.35 per cent. The output of copper was 4,400 tons; that of wolfram, 31,526 cwt., and bauxite, 9,280 cwts.



LAKE ASHI AT HAKONE IN THE HOT SPRING DISTRICT REACHED BY THE JAPANESE RAILWAYS

IMPERIAL GOVERNMENT RAILWAYS OF JAPAN

[GENERAL RESUME OF ANNUAL REPORT FOR THE YEAR ENDING MARCH 31ST, 1914, AND STATISTICAL
REPORT TO MARCH 31ST, 1915]

The following report on the general working of the Imperial Government Railways of Japan, private and light railways and tramways in Japan proper and the South Manchuria Railway for the year ending March 31st, 1914, was submitted to H.E. Count Okuma, Minister President of State, by President Mitsugu Sengoku of the I. G. Railways of Japan. The total mileage of railways open to traffic at the end of the year under review was 7,231 miles, of which 5,473 miles were represented by the Imperial Government Railways, 1,061 miles by private and light railways, 697 miles by the South Manchuria Railway. The train mileage totalled 67,600,502 miles, the vehicle mileage 1,214,408,852 miles, the number of passengers carried 211,251,883 and the weight of goods hauled 47,063,324 tons, while the number of passengers carried one mile aggregated 4,227,712.134 and the weight of goods hauled one mile 4,223,855,803 tons. The total earnings derived from operation were 138,577,754 yen.

The mileage of tramways open to traffic aggregated 1,139 miles (comprising 565 miles of the electric, 203 miles of the steam-worked, 30 miles of the petroleum motor and 270 miles of the horse-drawn and 71 miles of the *rikisha*

tramways). The vehicle mileage totalled 114,192,021 miles, the number of passengers carried being 576,229,774 and the weight of goods hauled 1,188,269 tons. The earnings derived from operation were 24,721,171 yen.

The returns for the State lines are as follows:—

Traffic Results

The average mileage of railways open to traffic during the year under review was 5,298 miles for passenger traffic and 5,344.3 miles for goods traffic, an increase over the preceding year of 213.8 miles in the former and 218.2 miles in the latter. The train mileage aggregated 57,402,803 miles, the vehicle mileage 1,082,208,212 miles, being 3,408,871 miles and 93,952,225 miles, respectively, more than in the preceding year. The number of passengers carried totalled 167,773,143 and the weight of goods moved 36,348,362 tons, an increase of 7,061,406 in the former and 3,811,017 tons in the latter as compared with the preceding year. The total number of passengers carried one mile were 3,690,964.619 and the aggregate weight of goods moved one mile 3,053,852,638 tons, being

64,648,120 and 302,388,464 tons more than the respective figures for the preceding year.

Passenger Traffic

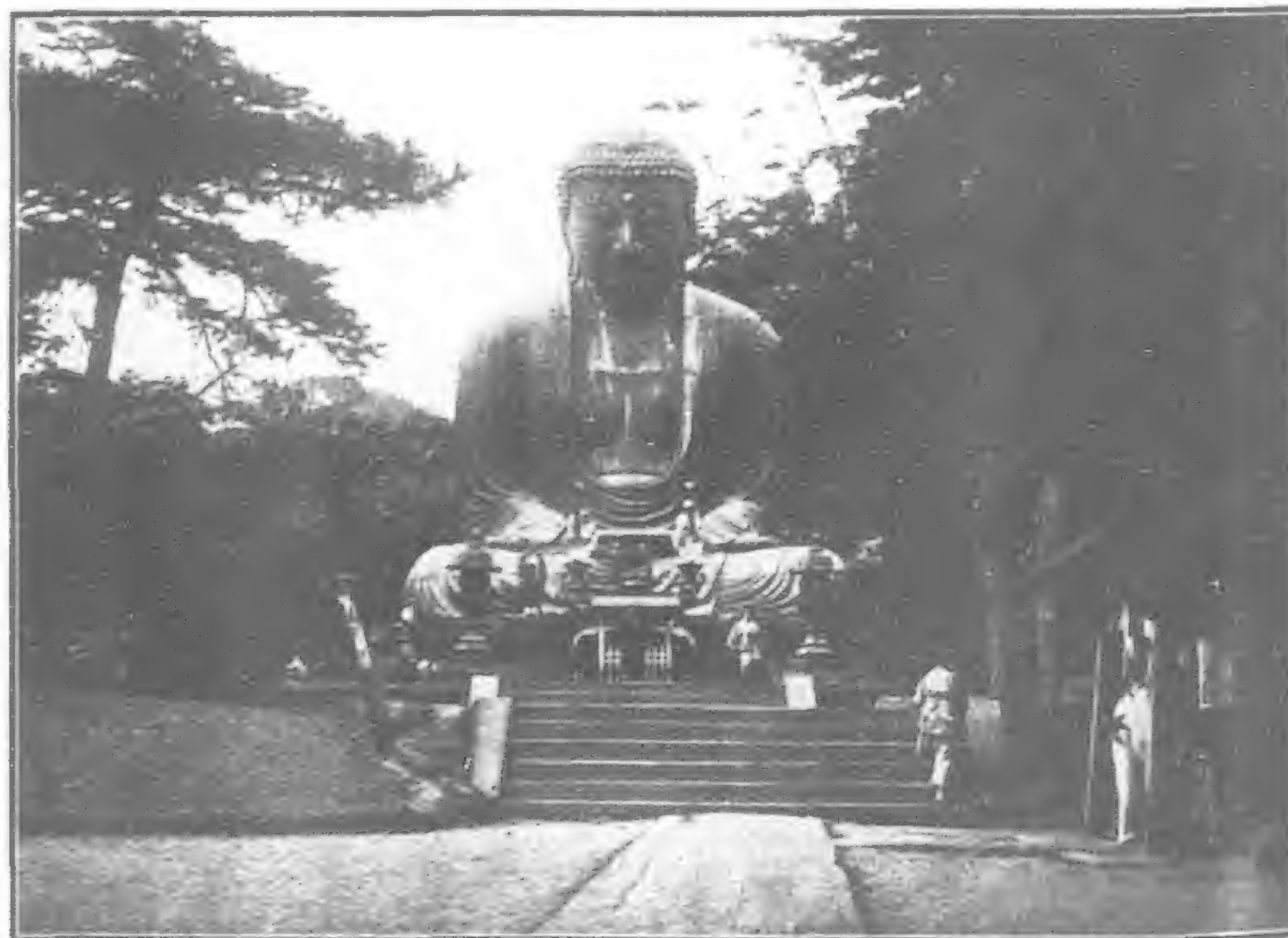
The earnings from operation were 55,975,342 yen for the coaching service, 53,308,932 yen for the goods, 2,240,842 yen for the shipping and 111,585,116 yen for the total, being an increase over the preceding year's figures of 5,760,592 yen in the total.

In reviewing the general results of traffic, it is noted that the depressing influence of the national mourning was generally manifest everywhere throughout the first half year, though, it is true, during the spring months a fair volume of passenger traffic was returned, notably in those districts served by the Hoku-roku line, the last section of which was newly opened to traffic, thus ushering in a new era in the through route with the Shin-Etsu line.

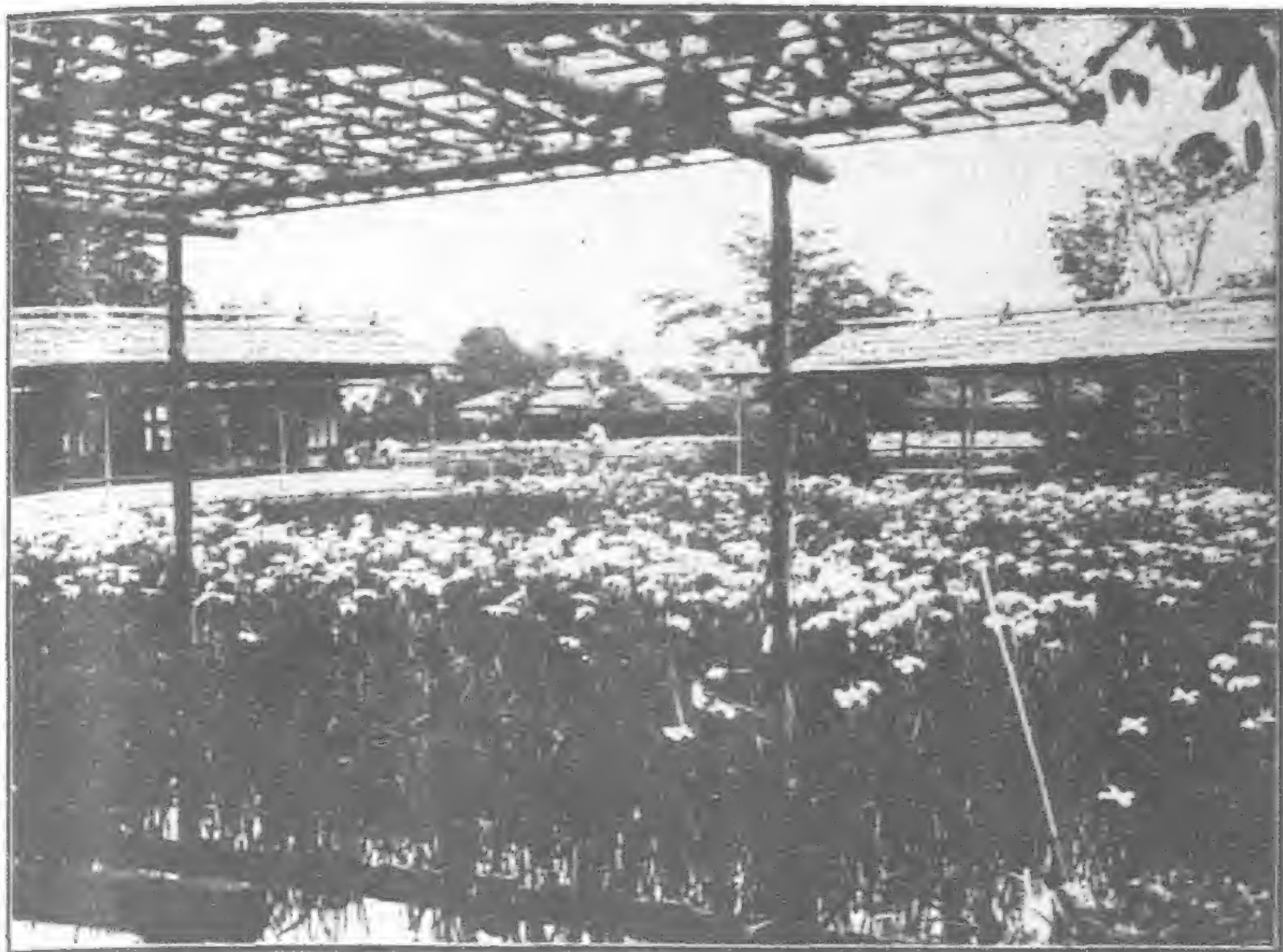
The Colonial Exhibition held at Osaka in May and the celebration of the anniversary of the demise of the late Emperor in July attracted a substantial number of visitors to the seats of the respective functions. With the expiry of the period of the national mourning, which happened at the time of



FAMOUS TORII AT ITSUKU ISLAND NEAR MIYAJIMA



COLOSSAL BUDDHA AT KAMAKURA



IRIS GARDEN NEAR TOKYO



VIEWING THE CHRYSANTHEMUM GARDEN

exodus of people to summer resorts, a general quickening of the passenger service began to be noticed, the returns of August and September being the heaviest on record for the year under review. In autumn the industrial fairs held at Yokohama and Toyama and the launching ceremony of the battle-cruiser "Haruna" at Kobe served an occasion of enlivening business, while the returns of holiday-makers going on autumnal picnics, such as maple-viewing and mushroom-gathering, compared well with the figures of the average year. The natural disasters in Akita and Kagoshima prefectures deranged train service to more or less extent, but on the whole the year closed with a fair prospect of business owing to the brisk transport of party passengers and visitors to the Taisho Exhibition held at Tokyo.

Goods Traffic

As compared with passenger traffic, goods business kept up a very satisfactory show throughout the year. The prosperous conditions noticed in the closing months of the preceding year were well maintained down to summer, foreign rice, manures, cotton yarn and tissue and other commodities returning, one and all, an unusually heavy booking. Owing to the crop failure the business was seriously affected in the Hokkaido and the north-eastern districts, but what was lost in this direction was partially made good by the traffic in cereals, manures, fuels, charcoals and other goods which were immensely carried from and to the above-mentioned districts

under 50 per cent. discount rates specially adopted for the benefit of the famine-stricken people. Toward the end of the fiscal year, the delivery of articles of summer consumption began, as is annually the case, to show signs of activity.

Traffic Arrangements

To give a list of the more important arrangements made for the service during the year under review, on April 20th the Awa Kyodo Kisen Steamshipping Co.'s railway line, a distance of 6.9 miles, and on October 13th the Ashio Railway Co.'s Shimoshinden-Ashio line, 25.7 miles, were leased and brought under the direct working of the Imperial Government Railways.

On November 1st a revision was effected in the Rules of Railway Transportation, whereby the new provision was made for allowing dogs and other pet animals to be taken into carriages, while a measure was devised to prevent fraudulent attempts to misrepresent consignment as to designation and amount.

On October 1st, first class carriages were withdrawn from a portion of local train service, the second and third class carriages being substituted in their place.

As a device of fostering the export of cotton yarn and tissue bound for Manchuria, which began to grow in amount of recent years, a reduction of freight thereon was put into force on August 10th in league with the Chosen Railway.

Joint Traffic

An extension was given to the scope covered by the oversea through traffic arrangements. The direct passenger and luggage service with the leading points in Western Europe for conveyance of passengers was inaugurated on June 10th, and on October 1st a similar service was opened with Peking and Tientsin on the Peking-Mudken line of the Chinese Government Railways.

At home, also, joint traffic arrangements were newly concluded with 16 railways and 3 steamshipping concerns.

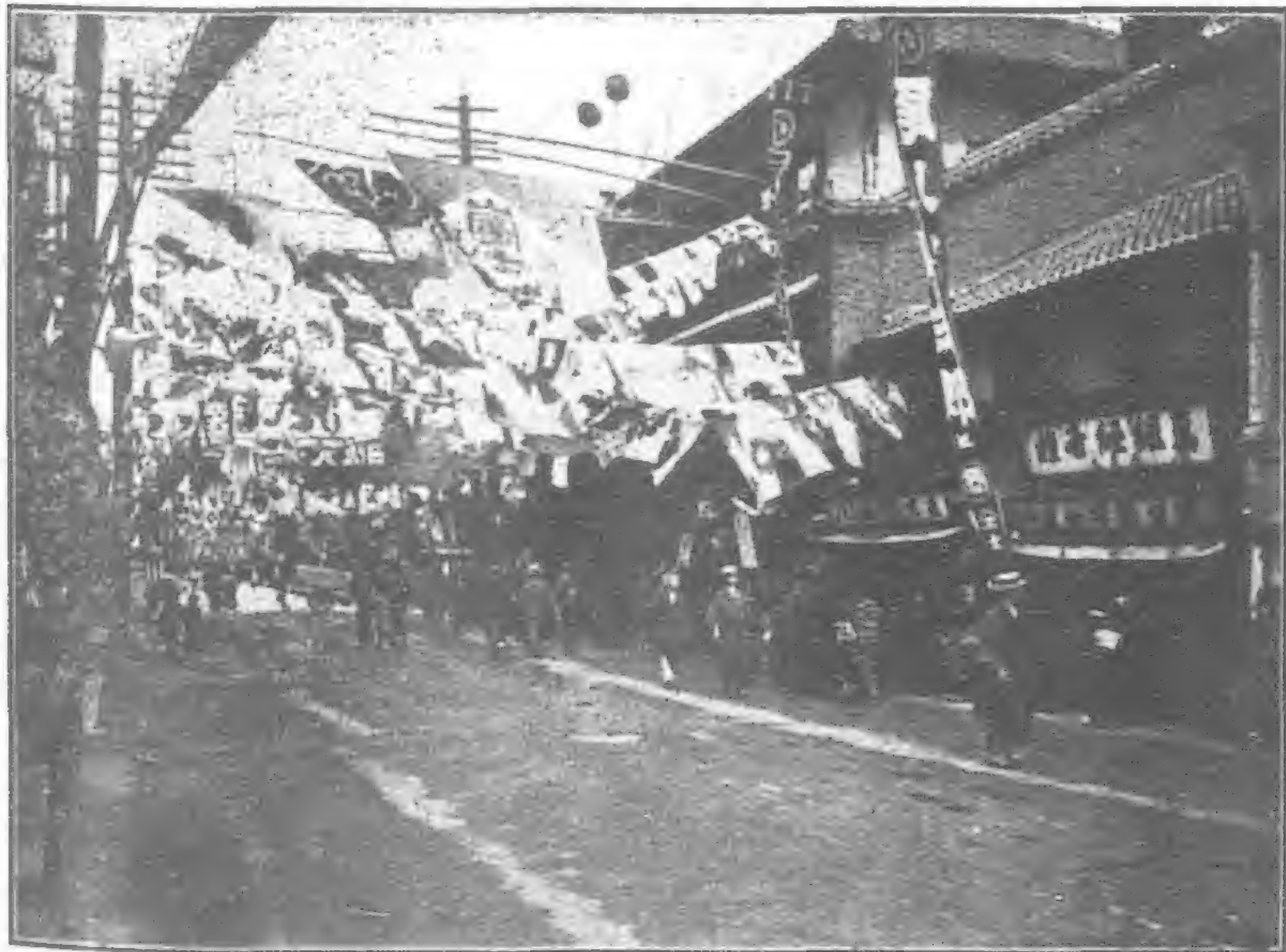
During the year working expenses amounted to 14,979,459 yen, an increase of 877,112 yen over the preceding year.

Shipping

The average length of lines worked for steamer service in operation during the year under review was 218.3 nautical miles. The number of steamers in commission at the end of the year was 35 representing a gross tonnage of 19,640 tons of which 4 vessels with a gross tonnage of 4,233 tons were chartered. The trips made during the year numbered 36,473. The expenses incurred by the shipping service during the year amounted to 2,379,085 yen, being 761,191 yen more than in the preceding year.

Locomotive Working

During the year under review locomotive mileage totalled 68,744,136 miles (inclusive of the figures of steam motor cars), vehicle



OSAKA STREET IN HOLIDAY ATTIRE



HIMEJI CASTLE BUILT IN XIV CENTURY

mileage 1,212,827,176 miles, the amount of coal consumed for running purposes 2,910,164,152 kin (inclusive of 4,105,720 kin of petroleum dregs as converted at 1 sho of oil=5.4 kin) representing 7,702,947 yen in value, while the amount of oil consumed aggregated 16,139 koku representing 348,954 yen in value. Compared with the preceding year's figures, these items show an increase of 3,946,251 miles in locomotive mileage, of 129,119,631 miles in vehicle mileage, of 262,687,087 kin in the amount of coal consumed representing 819,267 yen in value, and of 1,003 koku in the volume of oil consumed representing 49,463 yen in value. As regards the average of the foregoing items per 100 locomotive miles, coal works out to 4,233 kin representing 11,205 yen, an increase of 147 kin or 3.6 per cent. in amount and of .582 yen or 5.5 per cent. in value, and oil runs to .0235 koku representing .508 yen, an increase of .0001 koku or .4 per cent. in amount and an increase of .046 yen or 10 per cent. in value, while the amount of coal per 1000 vehicle miles works out to 2,399 kin representing 6,351 yen, a decrease of 44 kin or 1.8 per cent. in amount and .001 yen in value. The increase in the amount of coal per 100 locomotive miles is accounted for by the increased service of larger type engines, whose enhanced efficiency is demonstrated by the proportional decrease in the coal consumption per 1000 vehicle miles.

Transportation expenses required during the year under review totalled 14,892,049 yen, an increase of 1,487,279 yen as compared with the preceding year.

Rolling Stock

Rolling stock returns existing at the end of the year under review comprised 2,500 locomotives, 4 Imperial carriages, 6,449 passenger carriages and 42,705 goods wagons, showing an increase over the preceding year of 119 locomotives, 305 passenger carriages and 2,178 goods wagons. During the year various provisions were made for rolling stock and divers improvements carried thereon.

Rolling stock expenses incurred during the year amounted to 7,663,981 yen, being 19,546 yen more than in the preceding year.

Electricity

The length of electric communication lines extended 2,256 ri, and communication wires 24,151 ri with 2,035 sets of telegraph, 9,439 sets of telephone and 2,818 sets of block apparatus.

The number of messages accepted for transmission at properly equipped 1,486 stations totalled 48,011,977, inclusive of 6,746,526 of public telegrams for which the Railways received 248,656 yen as their share in the service. The power and transformer stations numbered 41 with 61 prime motors installed thereto developing 11,058 h.p., while generators aggregated 63 developing 8,217.54 k.w. and transformers 94 developing 8,383.5 k.w. The total length of power cables measured 116 ri and their wire length 442 ri with 392 motors in use representing 5,123,416 watts. The number of electric trams were 87 with 236 motors for running purposes representing 11,592 h.p. The electric lighting apparatus comprised 51,553 glow lamps developing 3,081,146 watts, 710 arc lamps with 419,019 watts, and 28,588 lamps fitted in carriages. Altogether, 13,455,896 k.w.h. were generated and 6,257,149 k.w.h. transformed.

The mileage travelled by electric trams aggregated 4,952,495 miles with 5,823,941 k.w.h. of current consumed for the running, while the electric locomotive mileage totalled 122,153 miles with the current consumed to the amount of 2,246,847 k.w.h.

Finance

The revenue account for the year under review gives 117,897,677 yen for revenue, 96,780,934 yen for expenditure and 1,322,428 yen for the balance of the light railway subsidies, leaving a surplus of 19,794,315 yen. After deducting light railway subsidies, rebates and advances, expenses on account of track

supervision, surveying, additional expenses and interest charges, there are left 113,477,055 yen for earnings and 54,551,246 yen for expenses, netting a profit of 58,925,809 yen. Compared with the preceding year's figures, the earnings increased by 5,451,417 yen, the expenses by 4,537,599 yen and the profit by 913,818 yen. The percentage of expenses to earnings from operation stands at 48.1 per cent., being an increase of 1.8 per cent.

As regards the reserve fund account, the revenue for the year amounted to 2,609,310 yen, which were carried forward to the next year's account, there being no disbursement charged to the same account during the year.

In the railway stores and workshop account, the profit amounted to 42,993,614 yen and the loss to 43,076,289 yen, leaving a debit balance of 77,675 yen.

The capital consolidated from the inception of the service down to the end of the preceding year aggregated 932,671,280 yen, to which were added 40,420,215 yen for the year under review, bringing the total to 973,091,495 yen of which 219,252,564 yen were represented by special capital and 753,838,931 yen by the loans.

Railway Stores

The purchase of railway stores totalled 33,081,213 yen including 2,900,375 yen of foreign purchase. Compared with the preceding year, the domestic supplies decreased by 6,106,916 yen, the foreign purchase by 3,175,244 yen and the total by 9,282,160 yen.

Maintenance Work

In maintenance work numerous provisions were made where necessary throughout the system with a view to maintaining the tracks in efficient condition commensurate with the requirements of increasing traffic. To be particular, the re-sleepering, the repair of roadbeds, the repainting and re-rivetting of iron bridge girders, the replacement of worn-out rails and fastenings as well as the repair of buildings were assiduously attended to, while on the other hand extensive repairs and alterations were carried out to permanent way and buildings in connection with the additional and improvement works. Though no small sum was expended upon emergency and restoration works incidental to hurricanes, torrential rainfall and washaways which involved the lines in more or less damage during the year, the best attention was paid to keeping down expenses as well as to ensuring the satisfactory repairs. Then, the remaining portion of the repair work due to the damage from the floods in the previous years was carried out in several parts of the system.

The amount of expenses debited to the maintenance work during the year was 12,624,686 yen, an increase of 1,272,183 yen over the preceding year.

Additional Work

In additional work, in pursuance of the policy of securing the facilities adequate to cope with the increasing traffic, particular attention was directed to the increase of siding accommodation, the enlargement and repair of buildings and structures and also the betterment of signalling and other safety appliances while various provisions were made in order to ensure better track and station accommodation.

Improvement Work

The amount of expenditure debited to the additional work was 1,617,392 yen, an increase of 556,649 yen over the preceding year.

To mention some of the more important items of improvement work carried out during the year under review, the laying of two additional tracks on the Ueno Uguisudani section, North Eastern line, and the duplication work on the Oyama-Utsunomiya section and the Kitasenju-Abiko section, Joban line, were brought to a finish. In the Tokaido line where the rearrangement of tracks and stations had been in hand for some years past, substantial progress was made as regards the laying of two additional tracks between

Shimbashi and Hodogaya, while the erection of the new Yokohama station was started, and the remaining portion of the duplication work was finished for the whole line with the completion of the girder erection of the Tenryu bridge. As to the laying of two additional tracks on the Shinagawa-Tabata section, Yamanote line, the duplication work between Shinagawa and Osaki was well forward, while the reclamation and extension at Shinagawa neared completion. In the duplication work on the Ofuna-Yokosuka line taken in hand during the year, the construction of a second line between Zushi and Taura and the erection of a new signal cabin were finished in greater parts. The water-and-rail terminal 'Link' and connected works for the Shimonoseki-Fusan ferry service were also well advanced. In the Kansai line, the duplication work between Osaka and Tamatsukuri was practically completed, while plate-laying was finished for the Kizu and Nara duplication work, the enlargement of Kizu station brought to the verge of completion, and the purchase of land nearly finished for the enlargement of Nara station. In the Kagoshima line the duplication between Orio and Ongagawa and the laying of Shippu branch line, continued from the preceding year, were completed. As regards the improvement work on the Hakodate-Otaru section, Hakodate line, the water-and-rail terminal 'Link' and connected works at Hakodate were commenced and the second reclamation work at Otaru completed in greater parts, while the reclamation and extension work at Temiya was completed as regards the pier and connected works continued from the preceding year. The Muroran reclamation and extension work was finished as regards the reclamation of the first section in the western part and the equipment of the recovered land in the eastern part, the completion of the track-laying on the latter section being now within sight. In the duplication between Oiwake and Yubari, the work on the Momijiyama and Shimizuzawa section made substantial progress. In the Tokyo Street line, the exterior and interior work of the Central Station building, continued from the preceding year, was finished, and the equipment and connected works are now well forward, while good progress was made with the construction of the main building of Karasumori station. The Central Station-Ueno and the Kajicho-Manseibashi section remain practically as they were left at the end of the preceding year.

New Stations

The new stations erected during the year comprised 3 on each of the Tokaido and the Kagoshima line, 2 on the Central line and one on each of the San-yo, the O-U, the Hakodate, the Koshiro, the Abashiri and the Horonai line, while a new block station was built on each of the Tokaido, the Shin-Etsu, the Hakodate and the Koshiro line.

Permanent way improvement was carried out where necessary throughout the system, including the enlargement of space between track centres, the reduction of gradients and curves, the construction of new bridges and renewal thereof, the replacement of light rails by heavier metals, the strengthening of the tracks with additional sleepers, and improvement of the roadbeds, while steps were taken to replace bridge girders by stronger metals and otherwise to re-inforce the girders.

The amount of expenditure on account of improvement work for the year was 22,591,407 yen, a decrease of 8,426,358 yen against the preceding year.

The length of lines open to traffic during the year was 5,472.7 miles (inclusive of 10.2 miles of the leased lines), being an increase of 255.7 miles over the preceding year, while the length of all tracks extended 8,323 m. 22 ch., an increase of 425 m. 74 ch. over the preceding year. The number of stations in service totalled 1,529, being 88 more than in the preceding year.

Construction Work

The following is a brief abstract of the more important items of construction work:—

The Izumomaichi-Oda section, Hamada line, was completed and opened to traffic on November 21st, 1913, as previously arranged, though the work was seriously hampered on account of the loose strata which marked the section at places. As regards the Oda-Hanenishi and the Hanenishi-Asari section, the same line, a slight modification was made in the plan of track and bridging in view of floods and other considerations.

No noteworthy progress was made in the construction of the Tsuwano line which was taken up only in parts.

Except the erection of a few buildings, no substantial start was made with the Obama line.

The remainder work on the Omi-Itoigawa section, Toyama line, was brought to a finish and opened for service on April 1st, 1913, wherewith the opening of service was effected on the whole of the Toyama-Naoetsu line.

In regard to the Kitakata-Tokusawa section, Gan-Iitsu line, the construction of the Kamanowaki cantilever bridge over the river Akano was brought to completion without a hitch, and with all equipment completed, the service was opened on the Yamato-Nozawa section on August 1st, 1913. The work on the Tokusawa-Omaki section which was seriously retarded owing to numerous engineering difficulties, remained to be finished as yet, while, with the completion of the Omaki-Satori sub-section, the service was opened on the Maoroshi-Tsukawa section on June 1st, 1913.

The Murakami line was practically completed as regards earthwork and other connected works.

The Koriyama-Miharu section, Taira line, was finished with the exception of a small part of work, and it is expected that it will be ready for operation early next year, the work on the remaining part on being well in hand.

In the Shinjo line, the Kogota-Iwadeyama section was completed and opened to traffic on April 20th, 1913, while the work on the Iwadeyama-Kawatabi section was practically finished and is expected to be available for use early next year. A partial alteration was made in the plan of tunneling work on the Kawatabi-Shinjo section which is regarded as one of the toughest works. The work on the Shinjo-Kiyokawa section, too, met with no small difficulties, but it was proceeded with as previously arranged, the Shinjo-Furukuchi section being opened for service on December 7th, 1913 and the Furukuchi-Kiyokawa section ready to be put into service early next year. Completion was practically effected on the Kiyokawa-Sakata section with the exception of part of the bridging of the river Mogami.

The Ohara-Katsuura section, Boso line, was completed with the equipment of all necessary provisions and opened for service on June 20th, 1913, the through service being thereby opened on the whole of the Boso line.

The Kisarazu-Minato section, Hojo line, made fair progress, while the work on the Minato-Hojo section has not made any substantial progress as yet.

The Oita-Kozaki section, Saiki line, was finished and is expected to be ready for operation early next year. No particular progress was made as yet with the Kozaki-Saiki section owing to the presence of loose strata at places.

The Tokushima line was opened for service on March 25th, 1914, and the Tadotsu-Kannonji section, Tadotsu line, was finished as originally arranged, the service being opened thereon on December 20th, 1913.

In the Sendai line, the Kagoshima-Higashi-ichiki section was opened for service on October 11th, 1913 and the Higashi-ichiki-Kushikino section on December 15th, 1913, while the remainder sections are finished and expected to be available for use at the beginning of next year.

Statistics of the I. J. G. Railways, Comparison of Fiscal Years 1914 and 1915.

		1914-1915	1913-14	Increase or (—) Decrease
		Total		
Open Mileage	{ Route Mile (m. ch.)	5,686.26	5,470.64	215.62
	{ Track Mile (m. ch.)	8,611.51	8,200.68	410.83
No. of Stations		1,604	1,529	75.00
Locomotives	{ Tank	1,259	1,248	11.00
	{ Tender	1,352	1,252	100.00
	{ Total	2,611	2,500	111.00
Passenger Carriages	{ 4-wheeled	4,279	4,245	34.00
	{ Bogie	2,414	2,208	206.00
	{ Total	6,693	6,453	240.00
Goods Wagons	{ Covered	20,535	19,726	809.00
	{ Open	23,167	22,979	188.00
	{ Total	43,702	42,705	997.00
No. of Passengers carried		166,092,421	167,773,143	—1,680,722
No. of Passengers carried one mile		3,623,743,236	3,690,964,619	—67,221,383
Tonnage of Goods hauled		35,272,875	36,348,362	—1,075,487
Tonnage of Goods hauled one mile		2,982,798,481	3,053,852,638	—71,054,157
Traffic Receipts (yen)	{ Coaching	54,671,971	55,975,342	—1,303,371
	{ Goods Wagon	51,750,496	53,368,932	—1,618,436
	{ Shipping	2,244,105	2,240,842	3,263
	{ Total	108,666,572	111,585,116	—2,918,544
No. of Passengers carried per day per mile		1,795	1,909	—114
Passenger Earnings per mile per passenger (yen)		.0138	.0139	—0.0001
Coaching Receipts per day per mile (yen)		27.09	28.95	—1.86
Tonnage of Goods per day per mile		1,464	1,566	—102
Goods Earnings per ton per mile (yen)		.0172	.0174	—0.0002
Goods Wagon Receipts per day per mile (yen)		25.40	27.36	—1.96
Traffic Receipts per day per mile (yen)		52.20	56.01	—3.81
Train Mileage		57,378,867	57,402,803	—23,936
Average No. of Vehicles coupled per train		18.7	18.9	—2
Vehicle Mileage	{ Passenger Carriages	355,101,502	345,223,815	9,877,687
	{ Goods Wagons	715,924,526	736,984,397	—21,059,871
	{ Total	1,071,026,028	1,082,208,212	—11,182,184
Locomotive Mileage		69,137,394	68,664,112	473,282
Average No. of Vehicles hauled per engine		17.65	17.66	—0.0001
	{ Nautical Mileage of Lines worked	218.3	218.3	—
	{ No. of Ships	42	35	7
Shipping	{ Gross Tonnage	21,515.82	19,640.05	1,875.77
	{ No. of Passengers carried	2,163,202	2,193,979	—30,777
	{ Earnings from passengers (yen)	1,163,632	1,213,866	—50,234
	{ Tonnage of Cargo	755,030	666,631	88,399
	{ Earnings from Cargo (yen)	921,429	875,082	46,347
	{ No. of Workshops	23	24	—1
Works	{ No. Workmen and labourers	14,991	15,918	—927
	{ Average Wages paid per day (yen)	10,273	11,186	—913
	{ Average Wages paid per day per capita (yen)	.707	.710	—3
Revenue Account	{ Traffic Receipts (yen)	112,169,616	113,477,055	—1,307,439
	{ Working Expenses (yen)	57,178,286	54,551,246	2,627,040
	{ Profit (yen)	54,991,330	58,925,809	—3,934,479
Capital Outlay	{ Construction Expenses (yen)	16,301,375	18,686,241	—2,384,866
	{ Improvement Expenses (yen)	22,230,487	22,591,407	—360,920
	{ Additional Expenses (yen)	3,362,088	2,617,392	744,696
Working Expenses analysed	{ Maintenance Expenses (yen)	13,084,922	12,624,686	460,236
	{ Transportation Expenses (yen)	16,794,654	14,892,049	1,902,605
	{ Traffic Expenses (yen)	15,628,158	14,979,459	648,699
	{ General Expenses, Maintenance of Equipment, Hotels, Shipping, etc. (yen)	11,670,551	12,055,051	—384,500
Capital (yen)		1,006,923,089	973,091,496	33,831,593
	{ President	1	1	—
	{ Vice-President	1	1	—
	{ Engineer-in-Chief	1	1	—
	{ Directors	6	6	—
Staff	{ Secretaries	143	133	10
	{ Engineers	322	308	14
	{ Clerks	4,569	4,526	43
	{ Assistant Engineers	2,140	2,175	—35
	{ Railway Foremen	687	104,936	—
	{ Inferiors and servants	29,432	—	—
	{ Labourers of regular employ	77,664	—	—
	{ Total	114,966	112,087	2,879
Relief Association	{ Brought over from last year	2,467,123.69	1,982,131.94	484,991.75
	{ Revenue	1,198,687.12	1,095,865.35	102,821.77
	{ Disbursements	540,447.74	610,873.60	70,425.86
	{ Carried forward to next year	3,125,363.07	2,467,123.69	658,239.38

In the Miyazaki line, the Kobayashimachi-Tanigashira section was opened to traffic on May 11th, 1913, the Tanigashira-Miyakonojo section on October 8th, 1913, and the Miyakonojo-Mimata section on February 11th, 1914. The Mimata-Yamanokuchi section, too, was well forward and is expected to be available for operation next year.

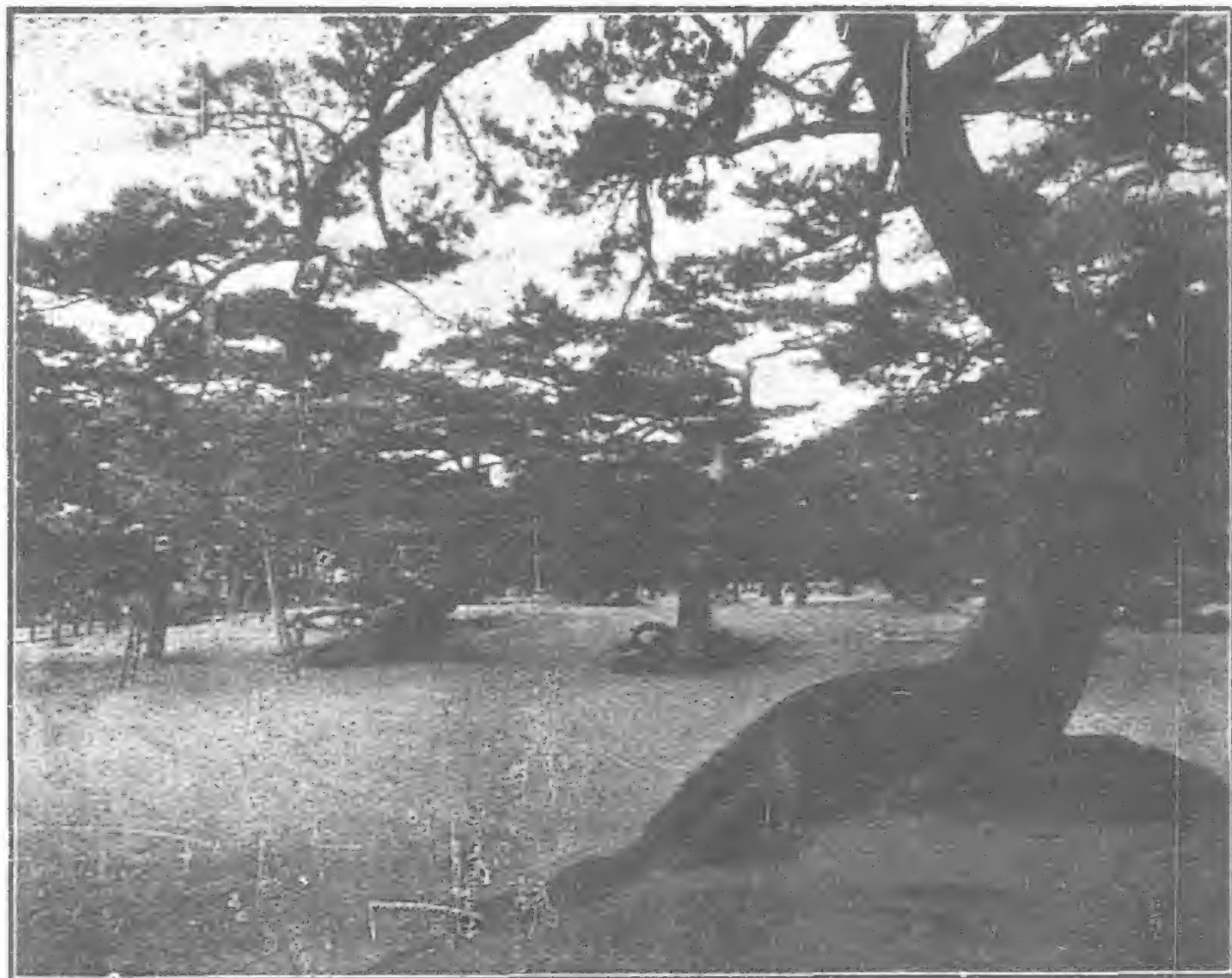
The Otoneppe-Kotombetsu section, Soya line, was seriously retarded owing to the difficulty in the transport of material. However, the work made fair progress, so

that it is expected to be put into service next year. No progress was made with the work on the Kotombetsu-Nakatombetsu section, as only a portion of it was taken up this year.

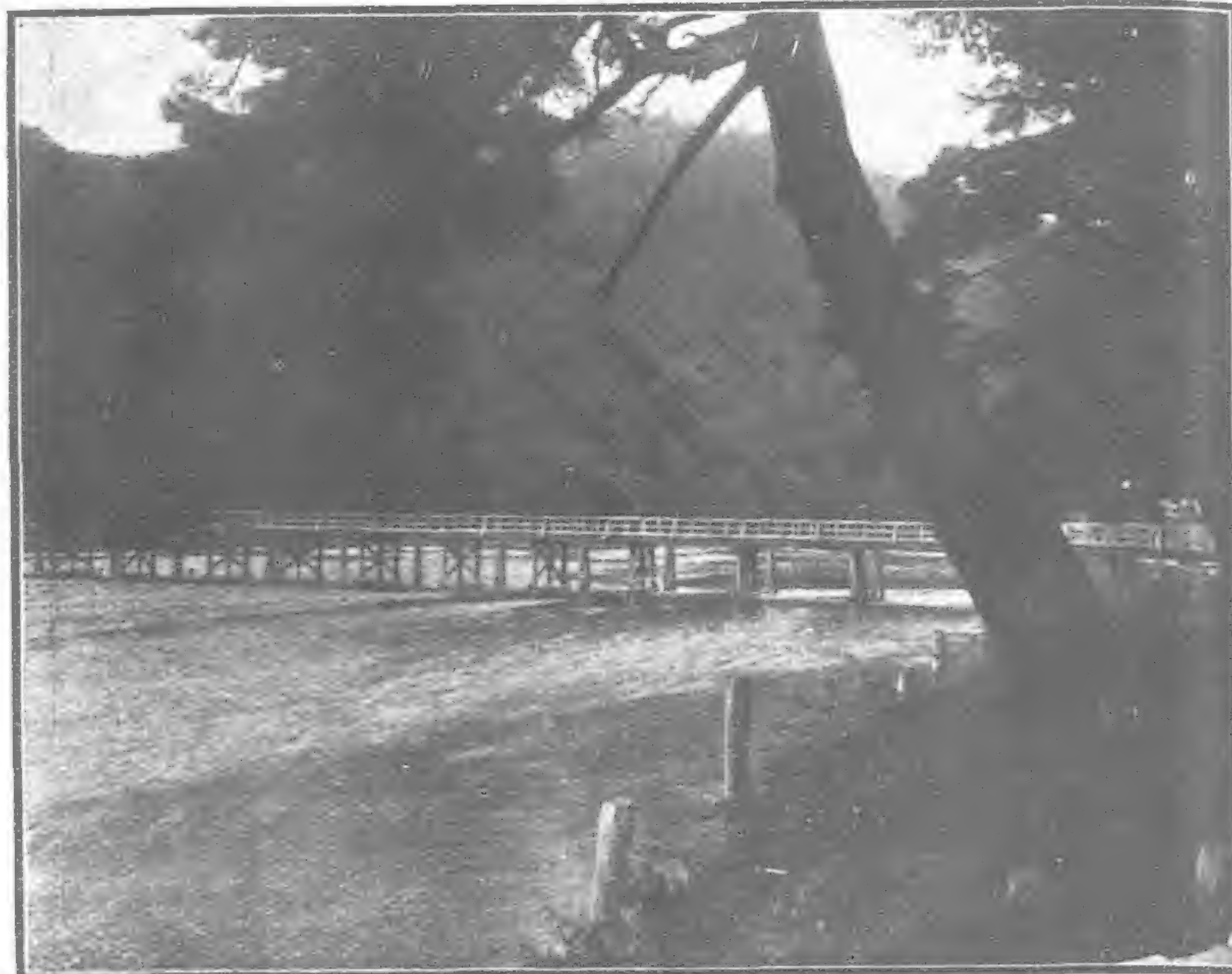
The Shimofurano line was brought to a finish as prearranged, and opened to traffic on November 10th, 1913.

As regards the Nemuro line, commencement was made with the purchase of land, no work being taken in hand as yet.

Turning next to light railway lines, the Moka line was opened for service on July



MAIKO PARK RENOWNED FOR DISTORTED PINE TREES



ARASHIYAMA BRIDGE NEAR KYOTO

11th, 1913, the Kamiiso line on September 15th, 1913, the Akayu-Nashigo section, Nagai line, on October 26th, 1913, and the Oiwake-Futada section, Funakawa line, on November 9th, 1913. The remainder portion of the Manji and the Nagai line as well as part of the Funakawa, the Inukai, the Miyaji, and the Yubetsu line were completed in greater parts, and are expected to be available for use next year.

The total outlay on construction works during the year amounted to 18,686,241 yen, an increase of 9,546,896 yen over the preceding year.

Railway Laboratory

In the Laboratory of the Railway Investigation Office, chemical experiments were carried out on cement, rubber, oils, brick, metals, etc., and tests made on the strength of metals and other materials. Tests were also conducted on the consumption of fuel and the tractive power of locomotives.

As regards sleepers, tests are now in progress on different kinds of wood creosoted, laying them on the specified tracks with a view to ascertain their durability.

Relief Association

In regard to the Relief Association, the Membership on the roll at the end of the year under review aggregated 102,352, an increase of 2,429 against the preceding year. The revenue to the coffers of the Association totalled 1,095,865 yen, and the expenditure 610,874 yen, and the balance 484,991 yen and 1,982,132 yen brought over from the preceding year's account, the total carried forward to the next year's account amounting to 2,467,123 yen. The Association maintains the Tokiwa Hospital in Tokyo and 10 dressing rooms at the workshops in the different localities.

validated. Nor was there any extension made in the open lines. In consequence the number of private railways, both open and not yet open, and their aggregate mileage remained the same as in the preceding year, being 9 companies representing 252 m. 10 ch. open to traffic and 353 m. 76 ch. under construction. In the list of light railways, however, a certain change has been brought about as a result of either new grants or invalidations of charters. The former covered 91 companies with the total mileage of 1,034 m. 27 ch. and the aggregate capital of 52,080,264 yen, and the latter represented 20 companies with 239 m. 47 ch. and 12,850,000 yen. The mileage of light railways open to traffic at the end of the year extended 324 m. 6 ch., which means an increase during the last twelve months of the total open mileage of light railways from 799 m. 12 ch. to 868 m. 77 ch. The lines under projection came up to 104 m. 10 ch. in total for the private railways, while in the light railways they represent 3,103 m. 68 ch.

The aggregate capital at the end of the year was 28,550,000 yen for the private railways and 56,539,222 yen for the light railways.

The rolling stock owned by the private and light railways open to traffic at the end of the

year consisted of 260 locomotives, 916 carriages, 160 electric trams, 16 steam motor cars and 3,285 wagons.

The locomotive mileage was 5,302,220 miles and the coal consumed 140,116,104 tons. The train mileage reached 4,460,910 miles and the passenger car mileage 21,032,041 miles, exclusive of the electric tram mileage and the steam motor car mileage amounting to 9,076,168 miles and 291,261 miles respectively, while the wagon mileage reached 17,831,690 miles.

The passengers carried during the year totalled 39,267,105, the passengers carried one mile 280,838,421, and the earnings derived therefrom 4,678,971 yen. The luggage conveyed totalled 16,700 tons, and the charges for same 119,226 yen. The goods hauled totalled 4,237,637 tons, the weight of goods hauled one mile 56,396,794 tons and the earnings accruing therefrom 1,685,305 yen.

The traffic receipts aggregated 7,135,510 yen and the working expenses 3,808,433 yen, leaving balance of profit to the amount of 3,327,083 yen.

The total number of the officials and employees amounted to 8,831.

PRIVATE AND LIGHT RAILWAYS IN JAPAN PROPER AND SOUTH MANCHURIA RAILWAY

During the year (1914-1915) there was not a single case of charter newly granted to private railways or of an old charter in-



WATER PIERCED ROCK NEAR MATSUSHIMA

ROYAL STATE RAILWAYS OF SIAM

[DIRECTOR GENERAL WEILER'S REPORT FOR THE YEAR 2457. A. D. 1914-15]

On 15th June 1914 a further section of the Northern line Pak Ta—Ban Pin was opened to traffic bringing the total length open up to 836 Kilometers made up as follows:—

Korat line (Bangkok—Korat) 264.1 km; Eastern line (Bangkok—Petriu) 63.4 km; River line (Makasan—River station) 6.5 km; Sawankaloke line (Bau Dara—Sawankaloke) 28.9 km; Northern line (Ban Phaji—Ban Pin) 473.1 km.

The capital outlay from the commencement on all open lines amounted at the close of the year to 56,383,969 Ticals as specified below:—Korat line, 17,673,189; Eastern line, 3,424,333; River line, 614,150; Sawankaloke line, 816,582; Northern line, 28,817,492; and the Den Chai—Ban Pin Northern Line of which accounts are not yet closed, 2,153,500; Extensions and improvements, 2,836,598; and Various surveys 48,125; Total 56,383,969.

Passenger Traffic

The number of passengers conveyed shows an increase in all classes, and in total 75,774. Regarding the passenger traffic on different sections the appreciable increase between Ban Phaji and Pitsanuloke is probably due to general development of these districts by extensive cultivation of former waste lands. Certain stations show noticeable increase in number of passengers as:—

Bangkok, 23,205; Ban Nong Don, 9,873; Ayuthia, 5,537; Tarua, 4,090; Chong Kae, 3,112; and Korat, 3,041. These are attributable to general development of the districts with residential and other places passed by the railway. The growth of Bang Sue with 14,667 is chiefly due to the establishment of the Cement-works and Don Muang with 3,832 to the Aviation-camps. The pilgrim traffic during the year shows a decrease of 3,013 passengers for Phrabat and 945 for Phraten. The increase of 9,392 Ticals for special trains is accounted to the military manoeuvres. Average fare paid per passenger was Tical 1.—and the average distance travelled per passenger 50.15 km. Average receipt per passenger per km. amounted to stangs 2. 02.

Goods and Live-stock Traffic

Receipts from Goods and Live-stock traffic show an increase of Ticals 122 722, as follows:

Goods Traffic

Deducting Railway materials for the Northern extension under construction, transported at a low rate, the total quantity of goods of all descriptions conveyed during the year under report shows an increase of 33,749 tons.

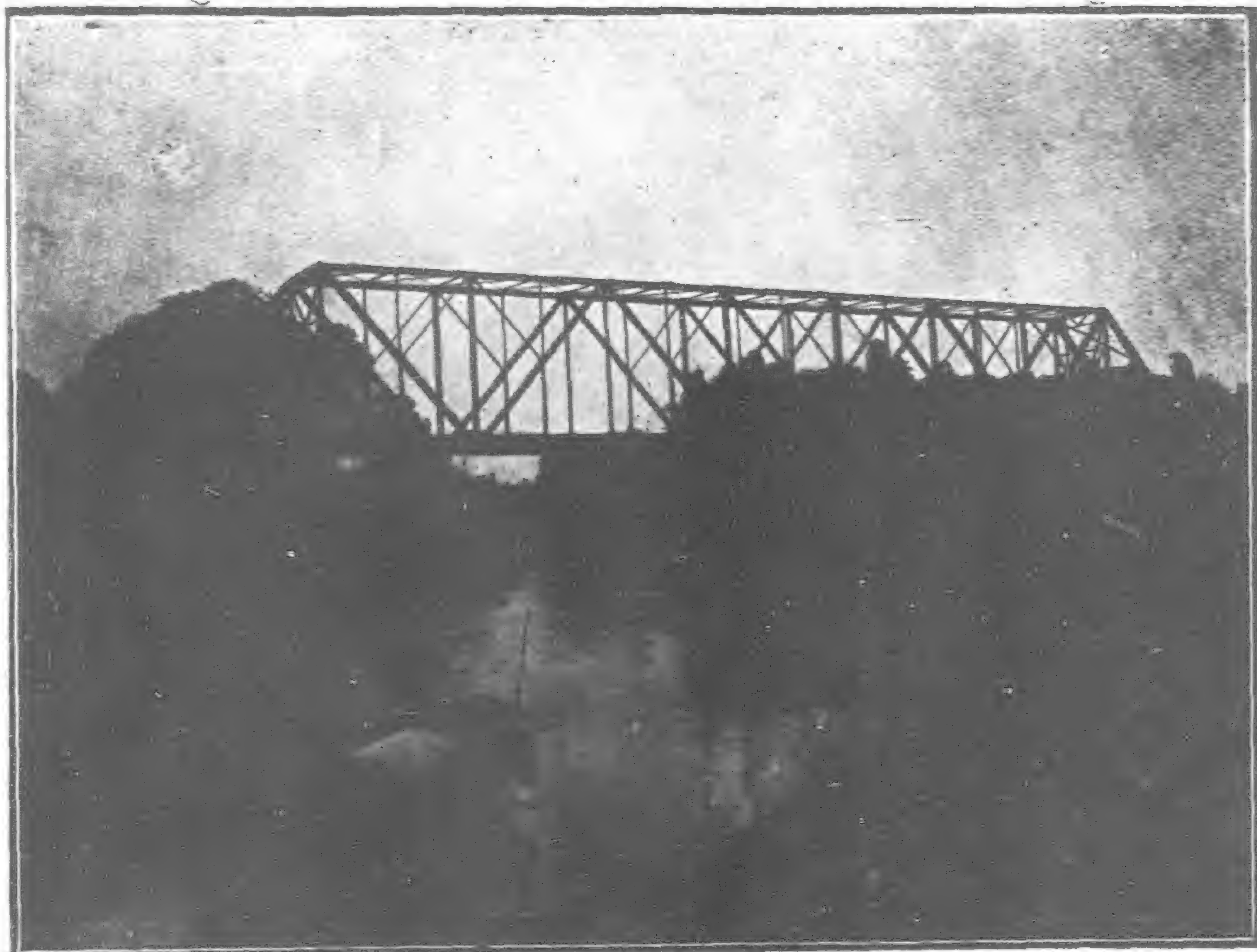
There has been a decrease of 1,004 head of livestock and 3,762 Ticals in income, the latter decrease being due to a falling off in cattle traffic from distant stations, while betel nuts etc.—increased 1,064 tons and sugar increased 1,074 tons. These increases are attributable to the inclusion of other, partly lower class goods, such as cocoanuts, kapi, tobacco, garlic, onions, potatoes, etc., booked under the class of betel nuts and sugar. The above goods are generally loaded together, but booked under the commodity of the principal highest class goods. This evidently is responsible for the increase in the two commodities, and decrease in the other named articles.

Building Materials

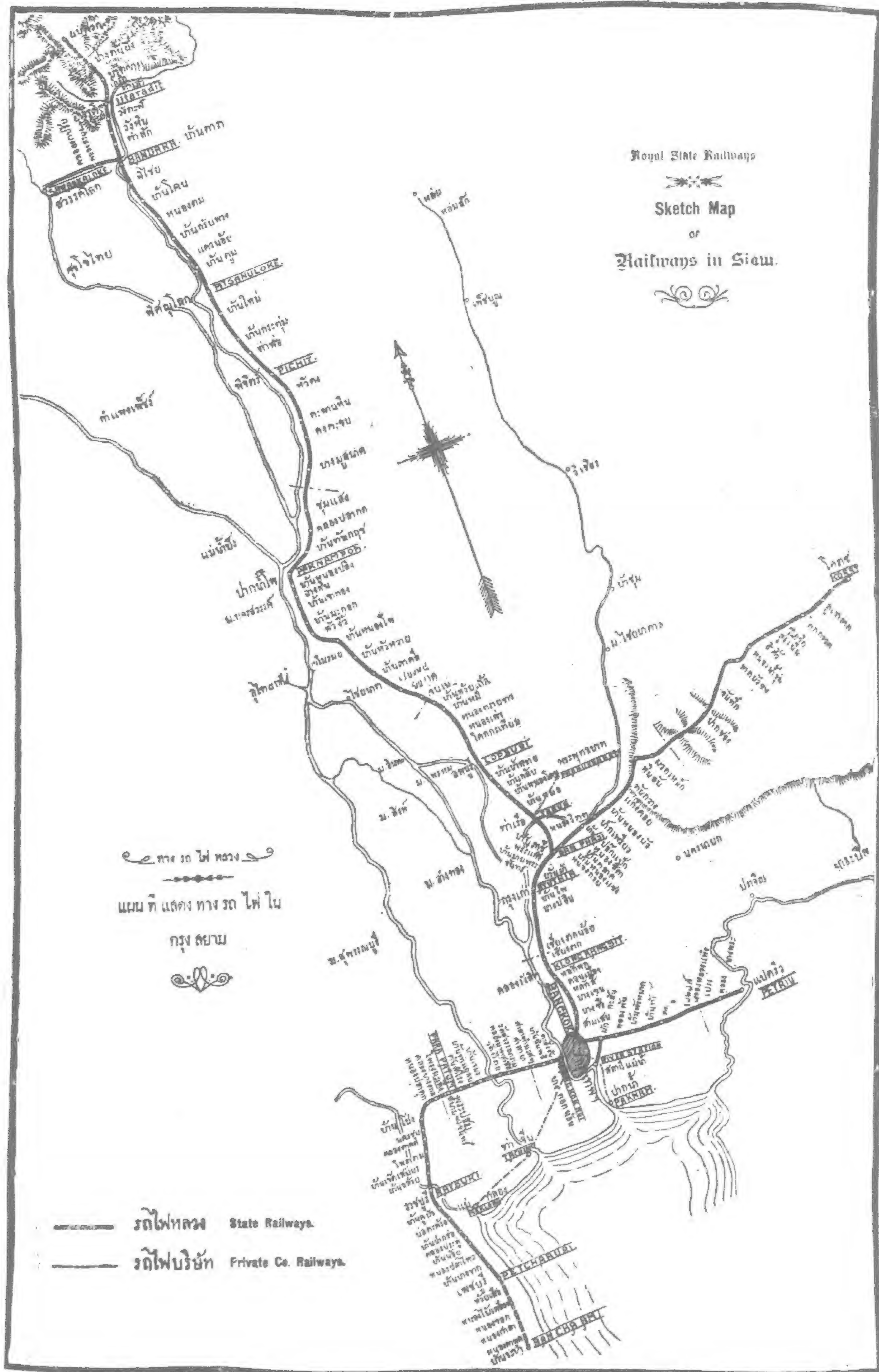
The general development of the buildings and structures in the interior is evidenced by the following increases in transport of building materials such as:—Bricks and tiles, 1,157 tons; Cement, 368 tons; Sand, 985 tons; Timber including logs 2,246 tons.



STATION AT PETRIU, SIAM



STEEL BRIDGE OVER KLONG THA LAW



The conspicuous absence in the transport of *Cardamum* can not otherwise be explained, than that of the difficulty of export and consequently the ruling low price.

Charcoal Shipments

The falling off 3,131 tons in Charcoal is probably due to over production caused by too many competitors during the last year, thus leaving still a considerable quantity of the stock unsold at the different stations. This tendency on their part resulted consequently in the reduction of transport of this article in the year under report. A decrease showing of 720 tons in this commodity must be accountable to less demand of black clothing, in Siam, as well as in the neighbouring countries. The welcome increase in firewood of 6,739 tons is the evident sign of the flourishing trade in this line. The second class wood, which is not suitable for Railway consumption, is found in abundance in the neighbourhood of the railway line, and with the exceptionally low rate for same, the business has helped to compete with those imported from the coast in former times.

The traffic in fruits shows increase of 655 tons more than the previous year, due to the increased demand, and in supply the stations Pichai, Utaradit and Sawankaloke contributed mostly towards the transport.

Hides and Horns show a decrease of 310 tons, the cause of which was owing to the difficulty in export. Gradually the transport increased again, but as the market prices were not profitable to the shippers a large stock is still kept up country.

Household goods have increased in transport by 858 tons. Kerosine oil, 369 tons; Packages, 1,775 tons; Rice, 834 tons; Salt, 1,645 tons; and this advancement is probably due to further extension of line in the North and the general prospects of the country along the line.

The staple production of the country, un-hulled rice, shows an increase by 4,331 tons in transport, and it is interesting to observe that in spite of a decrease on Ban Map Phra Chan—Gengkoi section of 12,272 tons and Sawankaloke line of 323 tons a total of 12,595 tons, there is a compensating item of an increase of 16,920 tons, i. e. from 4 sections. The increase is remarkable in view of the fact that the most of the lands situated on two of these sections were barren and uncultivated in prerailway days.

Sticklac shows a decrease of 770 tons, the cause being probably the same as explained under *Hides and Horns*.

Traffic Increase

The enhancement of traffic in stone shows 12,988 tons more carried than in the last year. The notable contributors to this increase are:—Bangkok, for public works, 3,600 tons; Bangkok, for water works, 5,810 tons; Korat, public works, 2,290 tons; and Pitsanuloke, public works, 1,030 tons.

The increase of 1,632 tons in water was due to the scarcity of rain in the Chong Kae district during the year under report. Special water tanks are provided in wagons for the purpose and water supplied from railway pulsometers of Paknampoh at low freight charge only. Average receipt per ton amounts to 5.17 Ticals and the mean distance goods were carried comes to 202.05 km. Average ton-kilometer receipt amounts to 2.56 stangs.

Rolling-stock.—During the year under report the rolling stock has been increased by 9 passenger cars. Stock on 31st March consisted of 58 locomotives, 219 passenger cars and vans, and 806 goods wagons. One locomotive of the oldest type was dismantled, being unserviceable.

Railway Staff

The total number in railway employ at the close of the year under report was 2,628. They consisted of 567 officials, 50 watchmen, 313 workmen and 1,698 coolies.

FINANCIAL RESULTS OF TWO YEARS COMPARED

	Year 2457 Ticals	Year 2456 Ticals	Increase Ticals	Increase in %
Gross Receipts	4,493,494	4,283,669	209,825	4.90
Working Expenses	1,550,644	1,518,345	32,299	2.13
Net Earnings	2,942,850	2,765,324	177,526	6.42
Contribution to Renovation Fund ...	280,931	273,813	7,118	2.60
Remaining Net Profit	2,661,919	2,491,511	170,408	6.84
Percentage on Capital Outlay	4.74	4.53	—	0.21

The percentage of expenditure to gross receipts was as follows:—

	Year 2457	Year 2456	Difference
Maintenance of Ways and Works	11.09	11.68	— 0.31
Locomotive Department	13.87	14.66	— 0.79
Traffic	7.86	8.22	— 0.36
General	0.79	0.88	— 0.09
Total	34.51	35.44	— 0.93

Receipts from Coaching traffic show an increase of 85,435 Ticals. Details are as follows:—

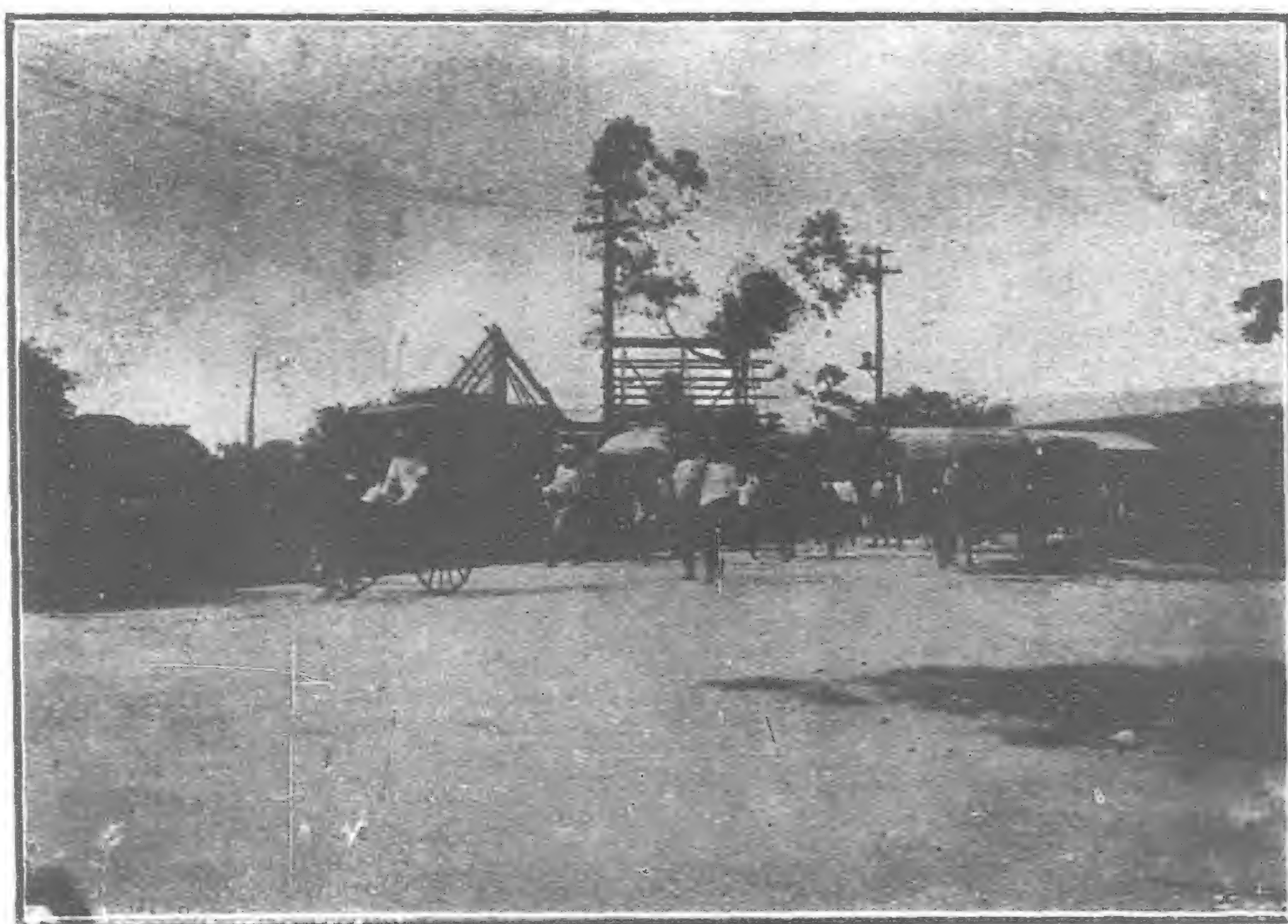
RECEIPTS FROM	Year 2457 No. Amount	Year 2456 No. Amount	Increase No. Amount
First Class	8,445 35,139	6,324 34,949	2,121 190
Second Class	35,822 101,899	34,033 100,880	1,789 1,019
Third Class	2,386,229 2,296,917	2,343,365 2,221,218	71,846 75,699
Total	2,430,496 2,433,955	2,354,722 2,357,047	75,774 76,908

STATEMENT OF ACCOUNTS OF THE RENOVATION FUND

Receipts	Ticals	Ticals	Expenditure	Ticals
Balance 1st April 1914	2,218,266.78		Purchase of 34,241 sleepers	46,713.40
4% interest on the capital of the fund for the year 2456		78,659.85	" " 736 bridge sleepers ...	3,191.95
Contribution for year 2457			" " 516 switch sleepers ...	2,776.45
a. from traffic earnings:				
1/2% on capital outlay (average during the year)		280,931.30		
b. from Construction funds:				
On lines under construction 4 locomotives each Tcs 692 ...	2,768			
On lines under construct. on 50 wagons each Tcs 46	2,300	5,068		
Total		2,582,925.93	Total	52,681.80

BALANCE

Receipts	Ticals 2,582,925.93
Expenditure	" 52,681.80
Balance on 31st March, 1915 ...	Ticals 2,530,244.13



STREET SCENE NEAR BANGKOK STATION

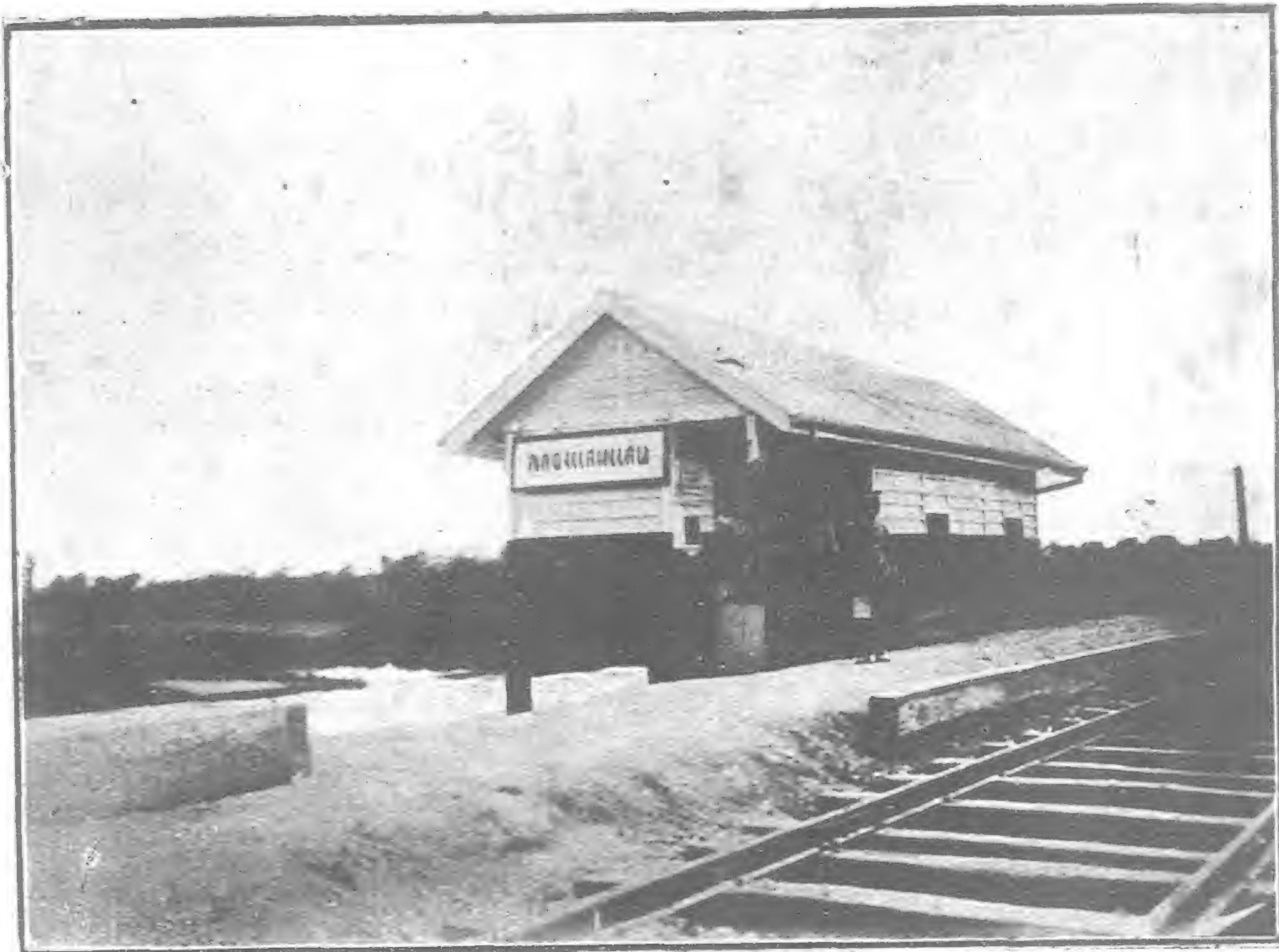
**TOTAL RECEIPTS AND EXPENDITURE
FOR THE YEAR 2457 (1914-1915)**

Receipts	Ticals
Coaching traffic	2,460,307.04
Goods traffic	1,807,948.58
Live-stock	134,712.30
Miscellaneous	81,526.06
Total receipts	4,493,493.98
" expenditure	1,550,644.03
Net earnings	2,942,849.95
Remitted to Treasury	2,530,814.57
Expenditure	Ticals
Personal emoluments	634,087.93
General charges	54,731.13
Expenses for maintenance of ways and works	390,631.10
" " fuel, pumps and rolling stock	407,530.79
" " new works which are not added to Capital Account	63,663.08
Total expenditure	1,550,644.03
Due to Treasury	412,035.38

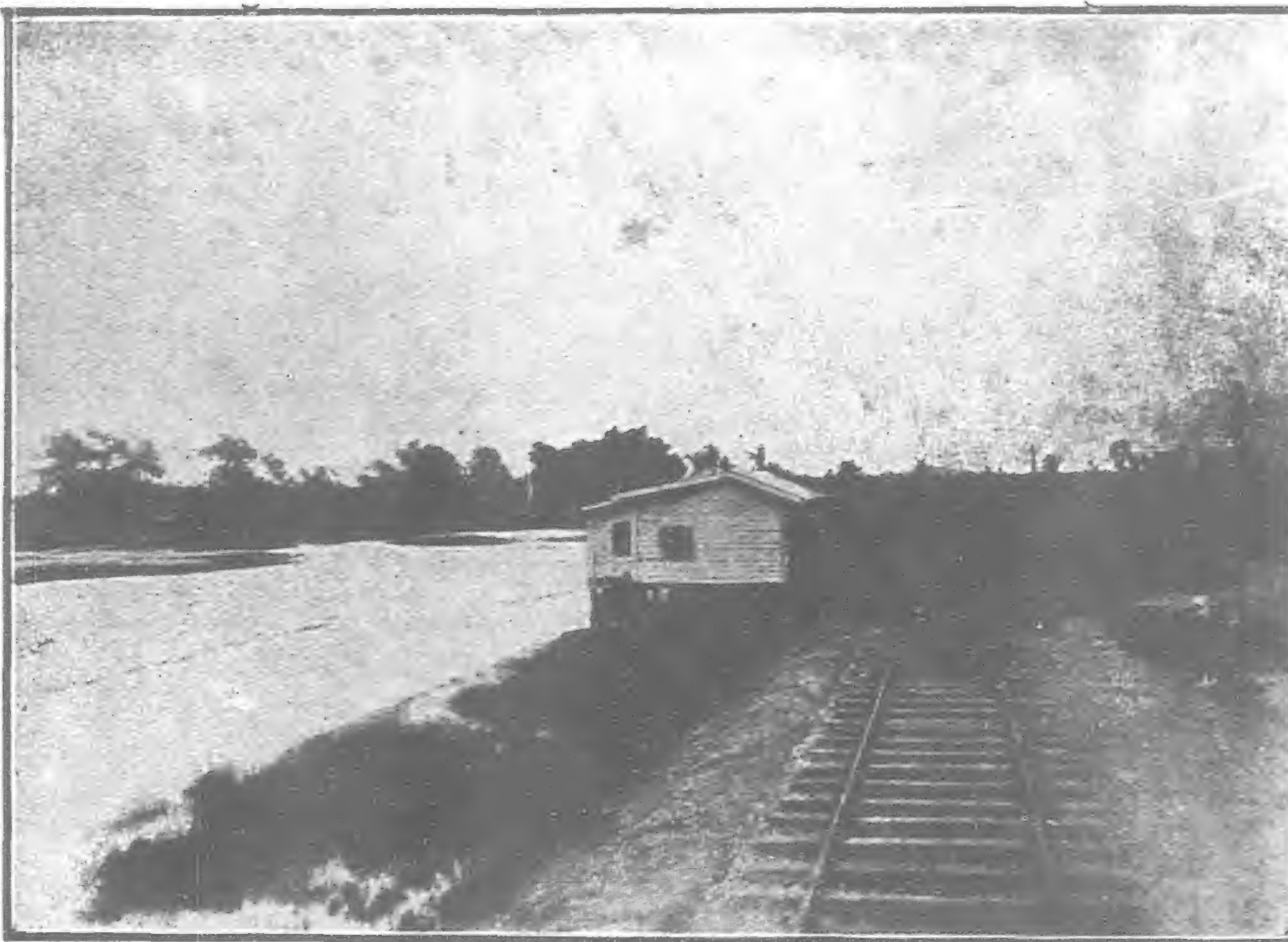
BALANCE, 31st MARCH, 1915

Ticals	Liabilities
3,563.86	Due to Postal Department, account of stamps
206,319.21	" Construction Department
421,035.38	" Treasury
2,530,244.13	Renovation fund
38,350.84	Depreciation fund for printing office plant
34,795.52	" fund for saw mill Nong Nam Khoon
5.50	" fund for boats and launches
31,171.86	" stone crushing plant at Chong Keh
500.—	Securities
1,842.95	Memorial Fund
Total 3,258,835.25	

Ticals	Assets
15,439.32	Stock value of printing papers and tickets
233,891.66	" " materials in the workshop
75,890.38	" " firewood
75,276.36	" " timber, at sawyard Nong Nam Khoon
4,035.—	" " explosives
122,468.81	Cash on hand with Accountant
141,749.93	Bank balance
3,563.86	Postal stamps on hand
2,530,244.13	Treasury balance for renovation fund
56,275.80	Sundry Debtors
Total 3,258,835.25	



STATION AT KLONG SENSEP



TYPICAL SMALLER STATION BUILDING

AN INTERESTING INSTALLATION OF GOULDS CENTRIFUGAL PUMPS

In the Hotel Baltimore, Kansas City, Missouri, water is distributed from a large pressure tank located on the roof of their twelve-story building. This tank is normally

kept charged by city pressure which is about 80 to 85 pounds at the basement. As this pressure drops at times these "booster" pumps are required in order to keep the tank filled.

Two of these pumps are in parallel each with a Cutler-Hammer pressure controlled self-starter to cut in one of them when the pressure drops below a certain point. One of these is kept in reserve all the time.

The discharge of the third pump is connected to the suction openings of the first two and

has a pressure control which will cut it in if the city water pressure should fail entirely as it sometimes does. In that case this pump and one of the first two will be working in series.

The pumps are Goulds Fig. 3001 No. 4-L Double Suction Centrifugals direct connected to 25 H. P., 1,400 R. P. M. Type S. K. Westinghouse Motors. Pumps have a capacity of 300 G. P. M. each.

THE PURIFICATION OF PUBLIC WATER SUPPLIES IN CHINA BY THE CANDY MECHANICAL FILTER

As all River Waters in China, as also many Well and other supplies, require purification before they are fit for human consumption, our Readers will be interested in the following description of the new system of Filtration carried out at Shameen, for converting the highly contaminated waters of the Canton River, into a safe, wholesome and brilliantly clear drinking supply.

This system known as the *Candy Declor Filter*, ensures the absolute destruction of the B. Coli, Typhoid Bacillus and Cholera Vibrio; it is in use at many large and well known towns in England, (such for instance as Reading and Windsor), and is one of the many types of Waterworks Filters supplied by the Candy Filter Company Limited, of Westminster, London, England, who specialize in Filter plants for rendering water fit for dietetic and other purposes.

By means of their various designs of Filters and Chemical Plants the Candy Filter Co. are able to deal with every kind of water and by removing therefrom impurities of all kinds, (i.e. bacteria, mud, silt, suspended matter, discolouration, etc., etc.), to make them fit for dietetic or manufacturing purposes.

The following copy of a Report shows the great success of the Filters, at Shameen, Canton City, China, dealing with the water from the Canton River.

Report on Candy Waterworks Filters at Shameen, Canton City, China, Dealing with Water from the Canton River

Canton, August, 1915.

Gentlemen,

"In reply to your request for some particulars of the new Waterworks we have lately designed and carried out for the island of Shameen at Canton, China, in connection with which your Filters were installed, I have pleasure in giving the following information:—

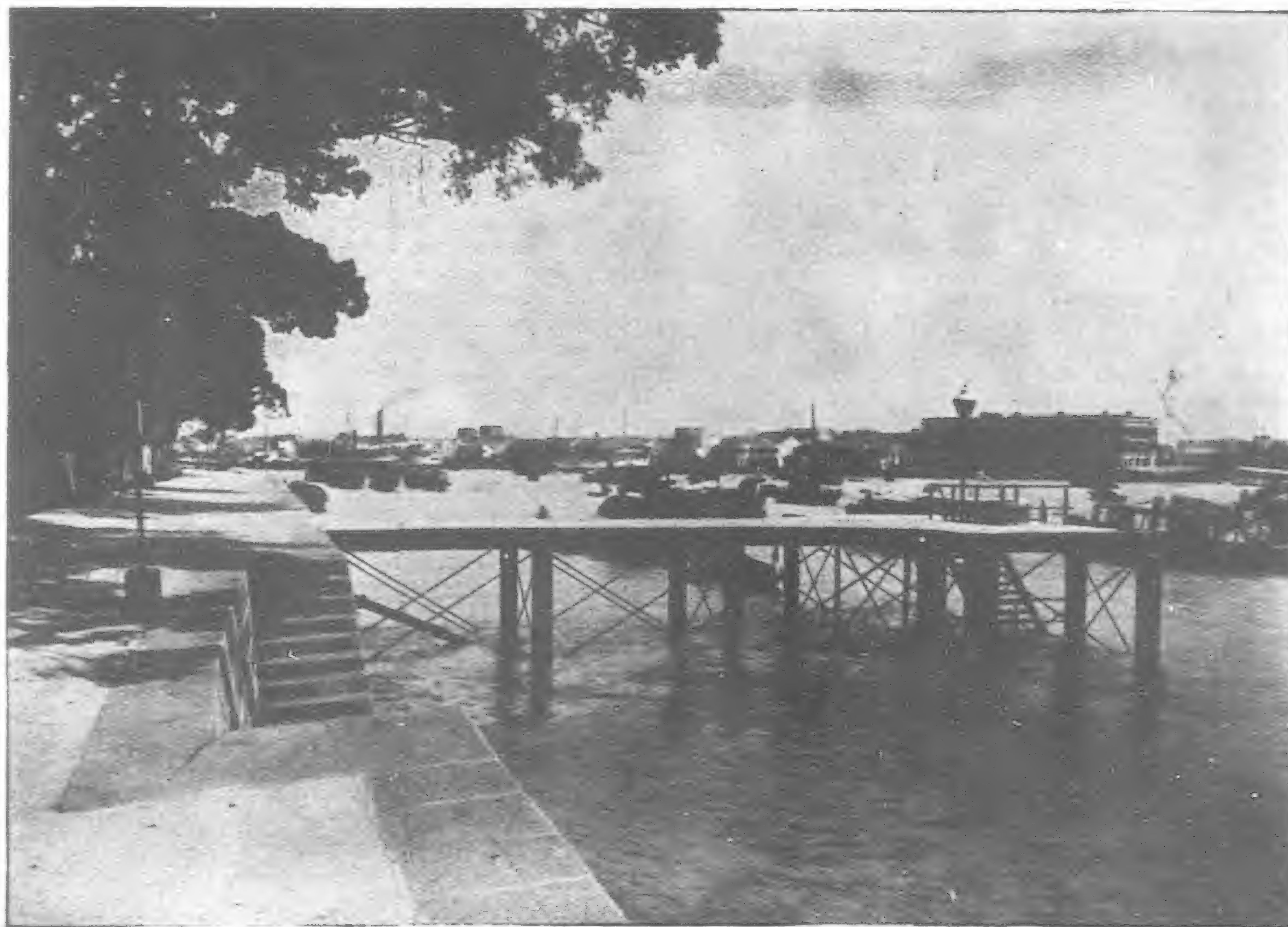
"Shameen is a small Island formed by the Canton River and a Canal, and is connected to Canton City by a bridge. The River is a large one, and can accommodate Ocean going steamers opposite Shameen. It passes through a thickly inhabited district, and has a very large floating population, moreover the River passes through large tracts of rice-growing fields which fields are largely manured by human excreta, therefore the water is considerably contaminated by sewage, and further is more or less turbid, especially so in the rainy season.

"The new Waterworks comprise a pumping station taking water from the Canton River immediately in front of the Shameen, an elevated storage tank adjacent, 95 feet above ground, a Filter Plant and a distribution system.

"Owing to the nature of the water it is essential that the Filter Plant should be capable of dealing effectually with the turbidity which is of a difficult nature, and also be a complete safeguard against waterborne disease. For these reasons, after considering various types of Filters, we decided to instal your Compound Declor Filters with Alumina and Chlorine Injection Plant, and pump the water through the Filters into the overhead storage tank.

"The installation consists of two Filter units, each capable of dealing with 7,500 gallons per hour, two Tangyes Vertical Treble Ram Pumps, two Suction Gas Engines and Gas Producer; the Pumps and Gas Engines being in duplicate can be used singly or in pairs as may be required, and are housed together with the Chemical Plant in one building. As will be seen from the accompanying photos, the building is of substantial construction and well appointed, the floor and walls being tiled.

RIVER AT CANTON SHOW-
ING PIER UNDER WHICH IS
CARRIED SUCTION PIPE—
ABOVE IS ELEVATED TANK
AND SUPPORTING STRUCTURE.



"Each Filter is divided horizontally into two distinct and independent parts. The water on its way to the pumps, receives the Alumina solution in proportion, and is then lifted through the upper parts of the Filters which contain the Compound or Double Beds of filtering material. Here the turbidity is effectually dealt with, and the water then passes up to the overhead tank, receiving en route the proper quantity of Chlorine solution. In the overhead tank, the Chlorine has time to act, and the water then passes down and through the lower parts of the Filters, which contain the Declor Filter Bed, by means of which, the excess of Chlorine remaining is removed, and the water goes into the mains clear and bright, and bacteriologically safe.

"The Filters, Pumps, Gas Engines and Gas Plant, are looked after by three intelligent Chinese attendants, and the hours of pumping are about six hours per diem during the summer and five hours during the winter months.

"The Filters are washed out at varying intervals, dependent upon the condition of the water in the river; during the flood season we find it necessary to wash out the Filters every other day, but during the dry season we find once or twice a week is sufficient.

"When taken from the river before filtering, the water apart from being as a rule very turbid is quite unfit bacteriologically for potable purposes. Since we have found by experience the proper quantity of Alumina and Chlorine to use, the Filters are giving us, and the residents, every satisfaction. The Medical Officer of Health who tests the water regularly by MacConkey's method reports that it is eminently satisfactory.

"I may mention that the filtered water, besides being used for ordinary domestic purposes, supplies a Swimming Bath and the water viewed in bulk in this Bath is a severe test of the effectiveness of the filtration for the removal of the turbidity.

"I feel that we have discovered in the Compound Declor System, a Filter capable of dealing with very difficult waters, of which that from the Canton River is a case in point, and I am glad to be able to advise its adoption in connection with various schemes we have on hand, with the confidence born of experience that the system can be thoroughly relied upon."

Yours faithfully,

(Signed) F. R. J. ADAMS, A. M. I. Mech. E., Messrs. Thomas, Adams & Wood, Civil Engineers.

To Messrs. The Candy Filter Co., Ltd.
Westminster, London, S. W.

The Engineers under date August 30th, 1915, also kindly afforded the following supplementary information:—

Messrs. The Candy Filter Co., Ltd.,
Westminster,

Gentlemen,

"I have much pleasure in enclosing herewith some particulars of the Shameen Water Works. I have not sent them earlier as I wished to be thoroughly satisfied that we could get good water under the most adverse conditions, and the conditions for the last two months have been the worst on record; as you may have seen in the papers, the floods here last month were the highest and most disastrous ever known in the Province, the Shameen was four feet or so under water, a state of affairs which has never been known; the highest recorded water level being a few inches above Bund level some thirty years ago. As you can imagine, the amount of mud, sand, excreta, etc., which was carried down by the river was immense. The Pump House for five days was under water but as soon as possible after the flood had subsided sufficiently to allow the pumps to work, water was supplied to the Settlement. We did not increase the amount of chlorine usually used and that result was quite satisfactory. I enclose three reports of the Medical Officer, one made a week or so before the flood, one from sample of water taken immediately after the pumps were able to work again, and one three weeks later, from the last of which you will see we are getting excellent results; although a great part of the surrounding country is still under water.

I am, gentlemen,

Yours faithfully,

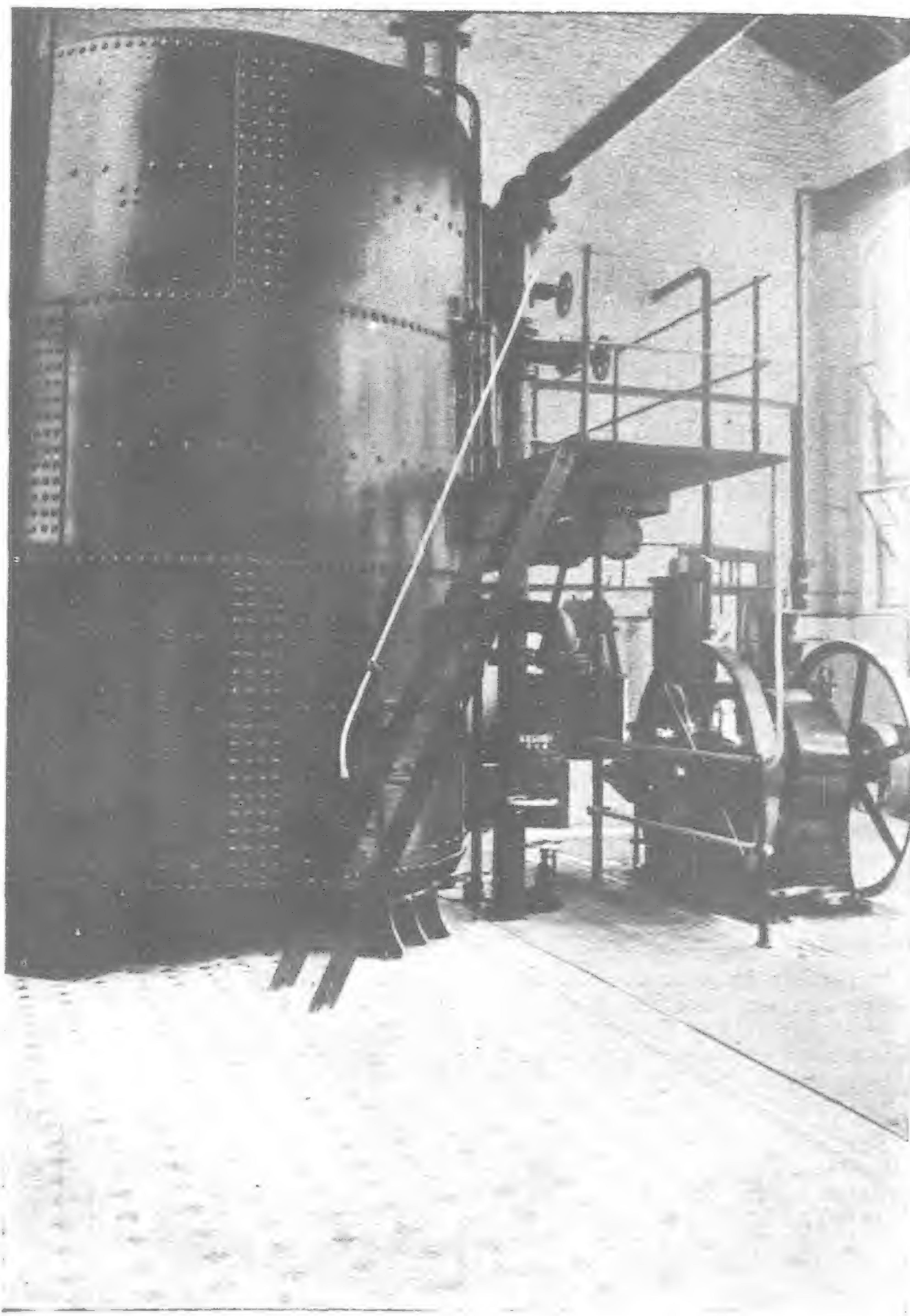
(Signed) F. R. J. ADAMS.

CHINA AS LUMBER MARKET

According to a Canadian Trade commission's report, the growing importance of the timber trade of China is a matter of much significance.

Considerable as the trade already is, the volume should materially increase in the future. The quality of timber sent to this market is known as China grade, which is not the first quality, but contains a certain percentage of marketable timber and the balance of No. 2. Formerly a large proportion of the demand was made up of large squared logs, 18 to 24 inches square, which were eventually sawn or worked up by hand by native workmen. Less of this class of lumber has been coming in of late than was formerly the case. The greater portion now usually comes already sawn in the form of large planks and long pieces of square timber, flooring and joists and other sawn lumber. Dressed lumber and tongued and grooved is not imported in any great quantity.

Railway sleepers have represented in some years a large proportion of the importation of softwood timber into China, and up to the present time, Japan has supplied by far the greater quantity of this class of wood. Jarrah wood from Australia has been used to some extent in railway construction on certain lines in South China, but on central and northern roads, such expensive wood has not yet been found to be necessary. Creosoted Oregon pine, white oak and tamo (the latter from Japan) are both cheaper and work out at a less annual cost, comparing the life of both kinds of wood, than that of Jarrah. Nevertheless, Jarrah is popular among British engineers engaged in railway management and construction in China. They are not as yet sufficiently familiar with creosoted pine or fir, and have no data as to the life of the latter in



VIEW OF ENGINE AND FILTER HOUSE

this country to go upon, and whether it is prejudice or not, are all very much disposed to employ Jarrah wood whenever possible.

The matter of tea boxes is a subject which requires study, for not all kinds of wood are suitable for this purpose. The latter must be distinctly free from odor of any kind, which might be deleterious to the sensitive flavor of the tea. In all other respects it need not be of any very high quality, so long as it is strong enough in fibre to securely hold the nails without splitting. In addition to the China market for tea boxes, there is also a similar market in Ceylon for the same article. A certain firm in Colombo has, for several years, been supplying that market with tea boxes made from Japanese wood. Boxes for the shipment of eggs are now being made locally in large quantity, and soap and candle boxes will probably be in demand at no great distant date. With the extension of the export trade of China, the employment of wooden boxes must greatly increase.

TUNGSTEN FROM MALAYSIA

During 1915, 3,939.71 piculs of tungsten were exported from the F.M.S., the duty on which amounted to \$5,074, being a decrease of \$2,720 on the sum collected in the previous year.

ENGINEERING, FINANCIAL AND INDUSTRIAL NEWS

RAILWAYS

New Railway in Inner Mongolia.—Amplifying the brief statement regarding the Ssuningkai—Chengchiatun Railway line that appeared in the Engineering and Financial columns of the *Far Eastern Review's* January issue, the following more detailed account giving the bearing of the road from a political standpoint, may be of interest. It is abstracted from a report by the Harbin correspondent of the *North China Daily News*.

The news that the new loan for the building of a new railway on similar terms as the Tsinpu Railway between Shihpingkai and Liaoyangchow, better known as Chengchiatun, has been successfully concluded with the Yokohama Specie Bank is only what was to be expected, for an understanding between the Chinese and Japanese Governments has existed for some time past. The importance of this line cannot be over-estimated, and though according to Japanese engineers' surveys the line will be only fifty-two miles, it will eventually be the first section of the main line to Taonanfu, which lies some 160 miles to the north of Liaoyangchow.

Taonanfu may now be designated as the northern boundary town in the Japanese sphere of influence, and though actually in Eastern Inner Mongolia and lying one and a half degrees due north of Changchun, which belongs to Kirin province, it is administered over by Fengtien Province, whose capital is Mukden. Once the construction of this main line to Taonanfu is decided upon, schemes will be on foot to continue this line on to Tsitsihar, the capital of the Heilungchiang province, but before anything definite can be decided, it will be necessary for the Chinese Government to come to an arrangement with the Russian Government, for all the territory north of Taonanfu lies in the Russian sphere of influence.

The actual situation from a Russian point of view created by the building of this quasi-Japanese line to Taonanfu is an interesting one, for it undoubtedly will affect traffic earnings in the Chinese Eastern railway, who will find it necessary to have at least branch lines to tap the natural wealth of Eastern Inner Mongolia and to link up with their main line in order not to allow the Japanese line to secure a monopoly of this trade and divert it southwards. I will at a later date deal with this important question of the future in detail. It is now necessary to give some details of the first section to Liaoyangchow on which work no doubt will begin this spring.

Lying some seventy-five miles south of Changchun, the northern terminus of the South Manchuria Railway system, on the main line to Tairen is Tsuningku station. The undulating stretch of country between these two points lying in the basin of the Liao, which is fully cultivated, resembles within a month of harvest a brown sea, for the principal crop grown is kaoliang, the staple food of man and beast in these districts. There is no Chinese town at Ssuningkai; it is a Japanese Railway settlement, pure and simple, governed by the Japanese authorities. It is, however, of historic interest, for it was here that the armistice agreement was signed by the delegates of Field-Marshal Oyama and General Linievitch before the Portsmouth Treaty had been arranged; and now again it is destined to play an important rôle, for from this point Japanese colonists, traders and bagmen will pour in and prepare the way to

secure a monopoly of the trading in Eastern Mongolia.

The present estimated population amounts to roughly some 6,000 souls, out of which some 10 per cent. are Japanese. It is only during the winter months that Shihpingkai shows any signs of commercial activity when produce is brought in here, as elsewhere, by native carts from the neighbouring districts, to be shipped southwards by rail. As it is the starting point for the trade marts of Eastern Mongolia, there is continually a stream of people arriving and going.

The present occupation of most of the Japanese residents with the exception of a few firms dealing in Japanese piecegoods and exporting of produce, is of a most despicable kind; medicine shops whose chief source of profit is the sale of morphia, pawnshops where extortionate interest is charged but no questions are asked as to where the goods to be pawned came from, gunshops where fire-arms and ammunition are sold to any one who can pay the price asked for, are to be found in the Settlement, and thrive at the expense of the natives.

The nearest Chinese town is Lishouhsien, situated thirty-five li north of Ssuningkai. Here a magistrate resides, under the jurisdiction of the Taotao of Taonanfu. The railway line will pass through Pamiencheng, a growing town boasting of 5,000 inhabitants on the main cart-road to Liaoyangchow. This latter city is one of the new marts in Eastern Mongolia opened up to international trade by virtue of the new Sino-Japanese Agreement. It stands on the right bank of the West Liao, which together with the East Liao form the dual head of the Liao River. It lies amidst a level plain sloping down on the western fringe, allowing this vulnerable portion of the town to ready flooding in time of heavy rain.

Forty years ago Chengchiatun was but a small village. The arrival of some Chinese interested in the cattle and horse trade marks the beginning of its growth. The immediate district is endowed with fertile soil, excellently adapted for agriculture, and the arrival of Chinese immigrants in increasing numbers has quickened the development of the place. In 1901 it was created a magistracy under the style of Liaoyang and five years later a river mart was opened near by at Sankiangkou, and this served to boom the junk traffic, whilst in 1913 it was made permissible for junks to go up the river a further seventy li beyond Sankiangkou, thus materially adding to its prosperity. The town has grown by degrees, and was not founded on a settled design, consequently there is a total absence of any shape of a design in building the town, and the layout of the streets is most irregular. From a village it was raised to a township, and from a township it has grown to a city. Its present population is somewhat under 40,000.

The city is some two miles in length and about a mile broad. There is no wall surrounding the town, but several of the produce dealers' and pawnbrokers' premises and compounds are enclosed with brick walls over 10 ft. in height, on which are mounted guns for protection against brigands. The principal Government Offices include the prefect's yamen, the tax-collectors' office, the Mongolian rent-collector's agency, the police station and the Court. Live stock fairs are held between the 8th and 11th moons of the old Chinese Calendar, but with the growth of agricultural produce the livestock trade has been universally affected.

The town is situated in the district often known by its Mongolian name, the Chelim

region; it is linked up with cart roads on the north via Kiating (another of the new marts opened to international trade) with Taonanfu, on the south with Fakumen and Hsinmingfu, on the west with Chinchow via Paiyintalai (also now opened up to international trade) and on the east with Tsuningkai and other railway stations on the South Manchuria Railway. Thus the trade centre of the Eastern part of Eastern Mongolia is centred at Liaoyangchow, and with the construction of above mentioned railway section is the key to the mine of the latent natural wealth contained in Inner Mongolia.

The actual building of these fifty-two miles of iron road should proceed apace, for the country is flat and the only piece of work attended with engineering difficulty is the railway bridge over the Liao, which lies about a mile to the east of Liaoyangchow. There seems no doubt that owing to the natural resources of the district through which the railway will pass that it will be put on a paying basis as soon as it is completed. Liaoyangchow even before it became opened up as an International mart had a Japanese population of over 100 souls, and Samunchang a few Japanese of the pedlaring classes. No doubt these numbers will be increased greatly this year.

Ssuningkai-Chengchiatun Railway.—Mr. S. Hori, Acting Director of the South Manchuria Railway Co., Bureau of Technics, has made the following observations regarding the delay in getting this projected line under way:—

It appeared at the time of signing the Agreement that the first thing was to appoint the Director of the Railway on China's part, and that the appointments of the chief engineer and other principal officials were to follow before the work of construction was begun. No official appointment of the Director has yet been bulletined. As matters stand, it is unlikely that the construction work will be begun this Spring. Unless the appointment of the Director and the Chief Engineer takes place during the present month of February, the construction work may be delayed one year, and the time for opening the line to traffic correspondingly put off. No thorough surveys have yet been made and some time must be allowed for the purchase of construction supplies. In the mean time cold weather will return, making the starting of work impossible. —*Manchuria Daily News*.

Later intelligence reports the appointment of Mr. Wu-wu (Director of the Kirin-Changchun Railway) to the additional post of Director of the Ssuningkai-Chengchiatun Railway.

The South Manchuria Railway Co. is hard put to it for rails as it has used all rails in stock, and finds it difficult to obtain a fresh supply either from abroad or from Japan. The rails of disused sections have been taken up to meet the more urgent requirements. The Railway Company negotiated with the Government Steel Works, Edamitsu, for a supply of rails, and was refused, but Baron Nakamura (the Company's President), who had been the reorganizer and President of the steel works for 13 years, induced the Works to furnish about 30 miles of rails. As to the 20 miles of rails wanted for the extension of sidings, etc., orders have been sent to the United States. On their arrival these rails will be exchanged for part of the lighter rails now on the Railway lines and the latter will be used for sidings and at the Collieries.

Inner Mongolian Survey.—According to the Chinese organ of the Mukden Government, the scheme to construct a railway between Chinchow and Dolonor via Chaoyang and Jehol, about 367 miles in distance, has made good progress, and the first surveys have already been finished.

Kirin-Changchun Railway.—As negotiations are about to be opened at Peking over the Kirin-Changchun Railway Loan Agreement, the Japanese residents at Kirin are said to have passed resolutions to the following effect:—

China shall be asked to accept all the demands advanced by Japan when the negotiations for the Railway Loan were originally taken up. The Kirin-Changchun Railway shall be raised to a similar standard of efficiency as the S. M. Railway. The poles of the Railway service telegraphic system shall be utilized for the establishment of a telegraphic service between Changchun and Kirin, and the Japanese post office at Kirin shall be opened to telegraphic traffic, or else the Kirin Railway Station shall be made to take up public telegraphic traffic in Japanese *kana* syllables.

The resolution has been presented to the Foreign Office, Tokyo, and the Japanese Legation through the Japanese Consulate, Kirin.

S. Manchurian and Shantung Railway Agreement.—The through passenger traffic agreement between the South Manchuria Railway Co. and the Shantung Railway was signed on February 5. The Dairen Kisen Kaisha also signed and the actual opening of the through passenger traffic is expected to take place before the end of the month. The steamship lines available will be the S. M. R. Co. Dairen-Tsingtau-Shanghai route and also the Dairen Kisen Kaisha route.

SHIPPING

U.S. Building Ships.—American shipyards have under construction now more vessels than ever before were building in the United States, to add to an American merchant marine whose gross tonnage already is the largest in the country's history, said a report issued by the commissioner of navigation. Ninety-eight merchant vessels of more than 3,000 tons are being built or are under contract. These with many small vessels being constructed have a total tonnage of 761,511. The total tonnage of ships under the American flag, numbering, 26,888, Dec. 1, was 8,444, 258, a net gain of more than 50,000 tons since July 1. There was a net gain of 187 ships, despite 272 vessels lost, abandoned, and sold to aliens. Twenty-three came under the American flag from foreign registry and 436 were completed in shipyards.

American Naval Menace.—The *Osaka Mainichi* says self-preservation or protection can become a cause of war. The programme of expansion of the American army and navy is about to be carried into practice. The necessity for it is attributed to the opening of the Panama Canal and to the need of securing supremacy on the Pacific, and this is explained as a measure of self-preservation. But when a country with inexhaustible wealth like the United States begins to build a formidable army and navy, she cannot but become a menace to others. It has been the long cherished desire of America to establish herself in China on the pretext of solving the Pacific Ocean problem. If therefore the armament expansion is part of the Pacific

problem, it cannot but be looked upon as a direct threat to this country.

Ferry Boat for Canton.—A 40 ft. motor ferry boat has been built by Messrs. Alex Ross and Co. in their yard at Kowloon for the Pak Hok Tong Launch Co. of Canton. The boat, which was designed by Captain Lukmanoff, and has been named the "White Crane," is engined with a Scripps 26 h.p. motor, and is provided with an electric starting system which also provides for the electric lighting of the boat. All the appointments are quite up to date, and the general design and seating arrangements present many practical novelties and improvements, all having special regard to the handling of boat and passengers in the crowded river between the Shameen and Pak Hok Tong. On the trials it accomplished a speed of 8.6 knots over the measured mile, which is considerably over the contract speed. The "White Crane" will be put into immediate service.

N.Y.K. to Raise Rates.—The N.Y.K. has decided that the freight rate in free vessels on the American line will be raised 20 per cent. from April 1. But the rates on valuable articles, less weight and bulk, will be unchanged. The charge of 100 pounds of raw silk is to be \$2, hemp braid \$1.87½ and waste silk 65½ sen.

Ice Breakers to Vladivostok.—A Chinese correspondent at Tientsin states that the Hai-ho Conservancy Board, having found it easy to keep open the river Pei-ho this year with two ice-breakers, has chartered the other two ice-breakers to the Kailan Mining Administration. These two steamers have gone to Vladivostok where they will be employed to assist the Russian ice-breakers in keeping open the two channels into the port, the one being used for ingress and the other for egress. The charter-price is not known.

Japan's Tonnage Decreases.—According to an investigation carried out by the Department of Communications, the total number of vessels which entered and left ports in Japan during the year 1915 was 8,975, with a total tonnage of 19,634,882. This is a decrease of 3,930,601 tons from that of last year.

Activity in Japan's Shipyards.—The shipbuilding industry in Japan is now in a very prosperous condition, all shipbuilding yards having orders to their full capacity. The number and tonnage of ships, which are now in the course of construction and for which shipbuilding subsidies have been granted are as follows:—

Name of Dock	Number of vessels	Tonnage
Mitsubishi Dockyards.	10	41,299
Kawasaki Dockyards.	8	38,580
Osaka Iron Works ...	14	42,340
Uraga Dock Co ...	5	10,640
Harima Dockyards ...	2	2,300
Fujita Dockyards ...	1	2,100
One Dockyards ...	1	1,250
Total ...	35	138,559

Besides, these shipbuilding yards are receiving large orders for future building, work on which has not yet been started. It is reported that the scarcity of shipbuilding materials is now being keenly felt, the present stock on hand being sufficient for only a very short period. The builders have to import the materials as the work advances, but the difficulty is that import from England is now practically impossible, while the American materials are either unsuitable for use in Japan because of the section length, or are too expensive. Vessels for transportation are

also scarce. Already some shipbuilding yards are experiencing great difficulty in obtaining materials. Moreover, the present prosperity in this industry has caused a great demand for skilled shipyard laborers, especially for first class men. This has resulted in competition among the shipyards to secure these laborers. Consequently, wages have risen. The present rate is from one yen to one yen and a half per day, but it is expected that the rate will further increase in future.

Japan's Mercantile Fleet.—Japan now occupies third place in the world's shipping according to a writer in the *Japan Times*. Lloyd's Register apportioned the world's tonnage before the war as follows, in millions of tons:—

British ...	21	French ...	2¼
American ...	6	Italian ...	1¾
German ...	4½	Japanese ...	1½
Norwegian ...	2½	Dutch ...	1½

Russia, Sweden, and Austria each have a million, and Spain and Denmark slightly less. The biggest sailing fleet belongs to Norway, while Japan's large junk and schooner fleet is not included in the returns, which take count only of vessels over 300 tons.

Mr. Wakamiya, of the mercantile marine bureau of the Department of Communications, has made the following statement regarding Japan's increase in Shipping facilities:—

Prior to the outbreak of war, the total tonnage of mercantile ships in the world was about 49,000,000 of which some 14,000,000 tons must now be deducted as so many ships are either destroyed or detained in enemy ports, while many others are employed for military uses. Before the war, twenty-three ships on an average used to come to Japan monthly from Europe, but the number is today less than half, while the American route is almost monopolised by Japanese shipping.

At present there are eleven periodical sailings of Japanese ships, eleven special ships on the European service, while the tramp boats, owned by Japanese, plying from one end of the globe to the other, number over sixty aggregating 400,000 tons. Japan is now 3rd in rank in the world's shipping, in contrast to the seventh place she held before the titanic war broke out in Europe. The immediate need for Japan is experienced and well disciplined seamen for this enormous expansion of her mercantile marine.

Progress in Shipbuilding.—Japan now has 2,132 vessels over 20 tons with a total tonnage of 1,604,900 while the number of vessels over 1,000 tons is 416 with a total tonnage of 1,331,308. The details are as follows:—

Ships	Number	Tonnage
20 tons to	100 tons	1,036 47,143
100 ..	300 ..	438 80,002
300 ..	500 ..	92 36,044
500 ..	1,000 ..	150 110,403
1,000 ..	2,000 ..	124 188,605
2,000 ..	3,000 ..	120 296,017
3,000 ..	4,000 ..	79 263,916
4,000 ..	5,000 ..	27 119,007
5,000 ..	6,000 ..	31 175,547
6,000 ..	7,000 ..	13 82,078
7,000 ..	8,000 ..	10 76,405
9,000 ..	10,000 ..	6 57,039
Over 10,000 tons		6 72,604

It is interesting to note that all this fleet has been created since 1884. For a period of 218 years—from 1635 to 1853—the building of vessels over 50 tons net was prohibited, and it was not until the arrival of three U.S. ships at Uraga under Commodore Perry the government was awakened. A few ships of European type were built by some of the daimyos, but as the Japanese shipbuilders were ignorant of the proper methods they only imitated the outside appearance. In 1845 a Russian man-of-war was washed ashore and sunk by earthquake. The Russians, with the assistance of some Japanese shipbuilders, started building a wooden schooner at Heda,

which gave the Japanese their first opportunity of observing the actual construction of European vessels. It was not, however, until 1884 that Japan really began to build ships of iron, while the first steel vessel was laid down in 1890.

Refloating P. & O. Nile.—The work of refloating the P. and O. liner, Nile, which sank near the island Iwai, in Yamaguchi prefecture, will be started Tuesday. The Mitsu Bishi Company is in charge of the work. The Department of Communications has announced that ordinary steamers will not be permitted to pass through the region during the period.

Taikoo Dock is Busy.—Delivery is expected to be made this month of one or both the two steamers which are being constructed at the Taikoo Dockyard, Hongkong, to the order of the Straits Steamship Company. Upon their being launched, it is reported that the ways will be used for the construction of two new vessels for the China Navigation Company.

China Imp. & Exp. Lumber Co. in Yangtze Trade.—The trial trip of the new steamer Tseangtah, built by the Kiangnan Dock and Engineering Works for the China Import and Export Lumber Co., Ltd., for the Yangtze River trade, was highly successful, an average speed of 11.2 knots being made. The new steamer is especially designed for the economical handling of lumber and bulk cargo. It has winches and equipment to swing 15 tons at a time, and a tonnage of 767.47; net 204.15. Its length is 215 feet over all, beam 35.2, depth of hold 13.9, designed to carry 750 tons drawing 9 feet of water and 1,100 tons on 11 feet. The vessel's maiden trip bore out the expectations of the company whose "three tree" flag is now well known on the river.

Diesel Engine Tanker's Long Trip.—A remarkable tribute to Diesel-engine, oil-burning oil tankers is paid in the recent report of the Anglo-Saxon Petroleum Co., an English oil shipping concern, which now operates nine tankers of this type ranging from 500 to 2,200 horsepower.

Referring to the "Selene," a 2,200-horsepower vessel, in service since the fall of 1914, the report states the vessel recently completed a 14,300-mile voyage without taking on fuel at any intermediate port, proceeding from Cardiff, Wales, to Port Arthur, Texas, thence via the Panama Canal to North China and thence to Singapore.

"This would not be an economical procedure in the case of a coal-burning vessel," reads the report, "for it would mean giving over a considerable portion of the ship's space to fuel bunkers. The master of the 'Selene' had orders to replenish the bunkers at Shanghai, but he found his consumption of oil fuel on the run across the Pacific so moderate no additional fuel was needed. All told the 'Selene' steamed 54 days with a full cargo of oil and 12 days on ballast only without replenishing her fuel supply.

"It might have been reasonably expected that, in the course of the first six months running, defects in the machinery would become manifest, but the 'Selene' and her sister vessel, the 'Artemis,' were sent across the North Atlantic and Pacific in the depth of winter, as soon as they left the builder's hands, on runs which would probably have not been considered in the case of a steam vessel."

China Mail Adds Capital.—The China Mail Steamship Co., has decided to increase its capital stock from \$2,100,000 to \$5,000,000, owing to the many stock subscriptions coming in, and also to the end that the company may more readily acquire additional steamers. Look Tin-eli, president of the Canton Bank,

of San Francisco, and president and general manager of the new company, has just announced the appointments of an assistant to the president and general manager and a general passenger agent.

Japanese Gain on Pacific.—The following figures show the number of ships and net tonnage, Japanese and American, in Pacific Coast ports and outward and inward bound in the Oriental trade in November 1914 and 1915. The figures were compiled by the foreign trade department of the San Francisco Chamber of Commerce:

November 1914 American steamers, 6, tonnage 45,315; Japanese steamers, 22, tonnage 89,932.

November 1915 American steamers, None, Japanese steamers, 42, tonnage, 141,262; Increase, Japanese 20, tonnage, 51,330; Per cent increase Japanese steamers 99.9; Japanese tonnage increase 57.0 per cent. It is reported there are from 25 to 40 Japanese steamers being built to secure control of the Pacific Ocean commerce.

New M. M. Steamer Porthos.—The S.S. Porthos belonging to the Messageries Maritimes Co., which left Marseilles on November 28, on its maiden trip, arrived in Shanghai early in the month bound for Japan. This vessel, a sistership to the S.S. Athos, was also built in Dunkirk and has the following dimensions:—Length, 530 feet; breadth, 62 feet; depth, 45 feet; and displacement, 18,133 tons.

The engines develop 9,000 horse-power. An average speed of 17½ knots was realized. The first-class portion of the ship with dining-room, music room, smoking room finely decorated, can accommodate 94 passengers. The second and third classes are fitted out with spacious cabins for 96 and 100 passengers respectively. The between decks are able to take over 1,000 persons. The cargo is loaded into five hatches with electric cranes of the latest type. The owners have devoted close attention to the matter of life-saving appliances on board. A great number of life-buoys can be put overboard merely by handling an electric switch. The hull of the ship, entirely of steel, is divided into ten water-tight compartments. All of them can be shut simultaneously from the bridge by the officer of the watch in case of danger, so that the Porthos is practically unsinkable.

FINANCE

Philippine National Bank.—As soon as the officers and board of directors have been appointed by the governor general the organization of the Philippine National Bank will be undertaken immediately. The officers and board of directors will be named by the governor general within a month at the latest, and as soon as they are ready for business, the appropriation of the government is ready for instant use, while the treasurer will turn over to them the agricultural bank, according to the terms of the act. The bill as passed on February 5, provides for the establishment of two branches or agencies in the United States, as may be determined by the board of directors, and authorizes the establishment of branches in foreign countries. Under a proposal made by the governor general, \$10,100,000 of government funds needed to supply the capital of the institution insofar as the bill stipulates that the government shall subscribe to the stock issue will be secured as follows: \$1,800,000 from the assets of the agricultural bank, \$1,300,000 from the insular surplus at present in the treasury, \$2,000,000 from insular trust funds, this amount to be made available for the payment of the stock subscription during the present year, and \$5,000,000

from insular treasury funds to be made available at the rate of \$1,000,000 per year during the next five years. The question regarding the funds which are to come from the insular treasury was not decided insofar as the manner in which they are to be made available is concerned. If they are appropriated for the purpose, the insular surplus will be reduced in proportion, but if the chief executive can be authorized to invest the sums from the surplus in stock of the bank, it is believed that this seeming shrinkage of the surplus can be avoided.

P. I. Customs Decrease.—Figures given out early in the month at the Manila custom house bearing upon collection for January 1916 show that collections for the port of Manila amounted to P875,353.06 as against P955,256.01 during the same month in 1915, thus leaving a decrease of P79,902.95. A slight loss is also reported from Iloilo where the collections for last month amounted to P102,649.86 as compared with P105,793.03 in January 1915.

China's Communications' Budget.—According to the Budget of the Ministry of Communications for 1916, the following amounts of estimated expenditure have been provided for the extension of its activities in the three principal departments:—On account of railways \$11,142,559; on account of telegraphs \$2,939,380; and on account of posts \$439,950. Total \$14,521,889.

Japan's Russian Bond Issue.—The issue of Russian bonds of ¥50,000,000 as advertised in the Tokyo and Osaka papers are for one year and bear interest of 5 per cent. per annum, that is, they are issued at 95 and redeemed after a year at par. Although the subscription is called for up to the 12th inst., it is generally believed that the general subscription will not reach that amount, in which event the underwriting banks will be saddled with the balance. The bankers are to receive 1 per cent as commission for underwriting. Therefore, the Russian Government have to pay 6 per cent in all. It is also reported that the money thus raised will be deposited with these banks as payment for the war material to be purchased here.—*Japan Advertiser.*

Committee Approves new Banks in China.—The bills providing for the establishment of the Japan-China Bank and the Bank of Manchuria were adopted at a meeting of the committee in charge of the measure in the House of Representatives February 14. The Bill for establishing the Manchurian Bank is composed of 38 articles and aims at facilitating the financial working for the development of South Manchuria and the eastern part of Inner Mongolia. The Bank is to be capitalized at ¥10,000,000, which is to be divided into 200,000 shares. Its head office is to be located at Mukden. The Directorate will consist of a president, a vice-president, and three directors, who are all to be nominated by the Government from amongst the shareholders. Three auditors are to be elected at a general meeting of the shareholders. The Bank is to engage in the loan service on the security of real estate, its leasehold, railways, well-secured credits, national bonds, debentures, negotiable instruments, and goods, the deposit service, the discounting of bills, the collection of charges, the remittance service, the trust business, the transactions in bullions, the exchange of currencies, the agency for other banks, and the issue of debentures. The Government undertakes to supply the Bank for ten years with any deficit that the Bank may have to face for distributing an annual dividend of 6 per cent.

The Bill relative to the proposed establishment of the Sino-Japanese Bank has for its sole object the cementing of the economical relations between Japan and China and the

development of the Japanese economical interests in China. The Bank is to be established at Shanghai on a capital of Y20,000,000 which is to be divided into 200,000 shares. The Directorate is to be composed of a president, two vice-presidents, three directors and three auditors. A vice-president, a director, and an auditor may be Chinese. The Bank is to be authorized to issue transferable debentures, appended with interest coupons, of denominations above Y10, up to the amount of 10 times its paid-up capital. The workings of the Bank are to lie under the supervision of the Government. The Government is to furnish the Bank for ten years with funds, if necessary, to enable the Bank to distribute an annual dividend of 6 per cent.

Japan's Specie Holdings.—Owing to the trade balance last year which was favorable to Japan the holding of specie has greatly increased. It is reported that the amount at the end of last year was 512,000,000 yen in all, showing an increase of 171,000,000 yen compared with the year before last. Of this amount 130,000,000 yen was held in Japan, an increase of 2,000,000 yen and 382,000,000 yen abroad, an increase of 169,000,000 yen over the previous year. Classified as to holders, the Government held 152,000,000 yen showing an increase of 103,000,000 yen over the year before, and the Bank of Japan 360,000,000 yen, an increase of 68,000,000 yen.

Mysore's Improvement Budget.—The Mysore Budget estimates for the year 1915-16, as provisionally passed, were for a revenue of Rs. 2,74,02,000 and an expenditure of Rs. 2,73,70,000 under service heads, leaving a surplus of Rs. 32,000. There was further a grant of Rs. 66,35,000 distributed as under for special capital works:—

	Rs.
Cauvery Reservoir and allied works	25,00,000
Capital outlay on State Railways and Steam Tramways	26,35,000
Subsidised or Aided Railways	7,00,000
Bangalore Electric Tramways	6,00,000
Cauvery Power Scheme, IV Installation	2,00,000
Total Rs.	66,35,000

China's Banks Prosper.—A Chinese Press report states that the Ministries of Finance and Communications have received reports from the Bank of China and the Bank of Communications showing the profits of the Bank of China during the twelve months ended December 1915, to have increased \$1,200,000 over the previous year, while the profits of the Bank of Communications during the same period show an increase of \$800,000.

Tokyo Bills Cleared Show Big Increase.

—There was a big increase in the amount of bills cleared in the Tokyo Clearing House for the latter half of the year, the increase being more conspicuous of late. According to the statement of the Tokyo Clearing House, the amount of bills cleared from the beginning of the year till December 25 reached 5,006,000,000 yen, the highest on record for many years past. As about 25,000,000 yen on the average is being cleared daily at present, the amount for the whole year is expected to reach over 5,200,000,000 yen, an increase of 700,000,000 yen compared with last year. The following shows the bills cleared in Tokyo Clearing House in past years:—

1905	... ..	Y 256,000,000
1906	... ..	350,000,000
1907	... ..	354,000,000
1908	... ..	296,000,000
1909	... ..	348,000,000
1910	... ..	384,000,000
1911	... ..	270,000,000
1912	... ..	412,000,000
1913	... ..	436,000,000

1914	... ..	449,000,000
1915	... ..	(Estimate) 520,000,000

Japan to Float Railway Bonds.—The Japanese Government, with the object of turning idle capital at home to good account has decided to float railway bonds of about Y20,-30,000,000 at home. The bill will be presented to Parliament as a supplementary Budget.

Japan Paying Loans.—The Government presented to the Imperial Diet the Supplementary Budget relative to the inclusion of Y38,600,000 in the sinking fund for the conversion of national loans, both foreign and domestic. Part of the 5 per cent. French railway bonds of Y77,400,000 redeemable within 12 years is to be paid back out of the sinking fund.

As to the flotation of the new domestic railway bonds, Mr. Kataoka (Chairman of the Budget Committee) stated that the bonds were to be issued at Y96 and Y97 net with 5 per cent. interest and to be made redeemable within 15 years.

P. I. Customs Decrease.—Gross customs collections for all ports in the Philippines except Balabac, for December, show a net decrease of P29,013.63 as compared with 1914, while the gross internal revenue collections on imported merchandise show an increase of P113,299.38.

MINES AND METALS

Seoul Mining Co., Korea.—The record of gold mined by the Seoul Mining Co., operating Tul Mi Chung and Suan, for the past 5 months is as follows:

Results for January, 1916:—Ore crushed, 18,745 tons.

Value bullion recovered	... ..	Y167,477
Value concentrates recovered	... ..	155,631

Total Receipts Y328,108

Operating costs (Approximate)	... ..	Y100,000
Operating earnings (Approximate)	... ..	223,108

The following tables give the result of working from September to December, 1915:—

SEPTEMBER

Total operating receipts	... ..	G. \$58,912
Less operating costs	... ..	27,500

Net operating earnings G. \$31,412

OCTOBER

Total operating receipts, Suan mine	G. \$48,959
Total operating receipts, Tul Mi Chung mine	19,300

Less operating costs (approximate)	68,259
	45,000

Net operating receipts G. \$23,259

NOVEMBER

Total operating receipts, Suan mine	G. \$59,095
Total operating receipts, Tul mi chung mine	28,955

Less operating costs (approximate)	88,050
	55,000

Net operating earnings G. \$33,050

DECEMBER

Total operating receipts, Suan mine	G. \$100,434
Total operating receipts, Tul mi chung mine	22,550

123,984

Total operating costs (approximate) 65,000

Total operating earnings G. \$57,984

JANUARY, 1916

Tons Ore Crushed, 16,745 tons.

Value Bullion Recovered	... ..	Yen 167,477.00
Value Concentrates Recovered	... ..	Yen 155,631.00

Total Receipts	... ..	Yen 323,108.00
Operating Costs (approximate)	... ..	Yen 100,000.00

Operating Earnings (approximate) Y223,108.00

The Luhokow Coal Mines.—A mandate issued on February 12 appoints Mr. Chang Cheng-fang, who is at present Chinese Director-General of the Fu Chung Kung Shih to be Director of the Luhokow Coal Mines in Honan. Originally, these mines belonged to a British concern, but they were later converted into a Chino-Belgian enterprise. The mines, which are situated in Changtehfu, are now entirely owned by Chinese capitalists with a certain proportion of capital supplied by the Central Government and the Honan provincial government.

Japanese at Hangchow.—Reports are that an enterprising Japanese is about to commence an iron foundry in the Settlement for the manufacture of silk-weaving and pattern-cutting machinery, of which at present quite a lot is imported from Japan.

Rich Silver Mine.—A silver mine at Pao-ching, Honan, has just been discovered. The ore contains 25 per cent of silver and 50 per cent of zinc, reports a vernacular paper. The local gentry are arranging for capital to operate the mine.

Japan's Hardware Market.—The effects of the war are daily enhanced in the hardware market and buyers are compelled to pay double, or in some cases three times, the prices paid last year. Enamelled hollowware is heavily demanded not only by British India, the Dutch Indies, and other Asiatic countries, but by Russia, France, and other European countries, which before the war sold such goods to Japan. Accordingly the Tokyo Hollowware Wholesalers' Association passed a resolution a few days ago that prices would be raised by 30 per cent.

Aluminium, copper, tin, and other ware is rising. Agricultural implements also have been affected by the boom in the metal market and there is a similar boom going on at the expense of farmers.

F.M.S. Gold Production.—The gold production in the F. M. S. during the last year amounted to 17,446 ozs. and was valued at \$67,604. In 1914, the figures were 14,272 ozs. and \$55,306 respectively.

Tungsten in Japan.—A very rich vein of tungsten has been discovered in a long range of hills in the Yamaguchi prefecture. According to the investigations conducted by the expert despatched by the Tokyo Imperial University, the vein now discovered is probably the largest ever found in the East and the ore obtained there is of very excellent quality. Experts from the Department of Agriculture and Commerce, too, are now on the spot to ascertain the extent of the vein and the quality of the ore obtained. In view of the increasing value of the ore as munition material the Government, it is learned, will undertake the working of the mine on its own account, instead of permitting private enterprise to prospect the ground.